# LG

# Service Manual
## KU380

**Model : KU380**

# LG

# Table Of Contents

# 1. INTRODUCTION

## 1.1 Purpose

This manual provides the information necessary to repair, calibration, description and download the features of this model.

## 1.2 Regulatory Information

### A. Security

Toll fraud, the unauthorized use of telecommunications system by an unauthorized part (for example, persons other than your company's employees, agents, subcontractors, or person working on your company's behalf) can result in substantial additional charges for your telecommunications services. System users are responsible for the security of own system.

There are may be risks of toll fraud associated with your telecommunications system. System users are responsible for programming and configuring the equipment to prevent unauthorized use. The manufacturer does not warrant that this product is immune from the above case but will prevent unauthorized use of common carrier telecommunication service of facilities accessed through or connected to it. The manufacturer will not be responsible for any charges that result from such unauthorized use.

### B. Incidence of Harm

If a telephone company determines that the equipment provided to customer is faulty and possibly causing harm or interruption in service to the telephone network, it should disconnect telephone service until repair can be done. A telephone company may temporarily disconnect service as long as repair is not done.

### C. Changes in Service

A local telephone company may make changes in its communications facilities or procedure. If these changes could reasonably be expected to affect the use of the phones or compatibility with the net work, the telephone company is required to give advanced written notice to the user, allowing the user to take appropriate steps to maintain telephone service.

### D. Maintenance Limitations

Maintenance limitations on the phones must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs expect as specifically noted in this manual. Therefore, note that unauthorized alternations or repair may affect the regulatory status of the system and may void any remaining warranty.

## E. Notice of Radiated Emissions

This model complies with rules regarding radiation and radio frequency emission as defined by local regulatory agencies. In accordance with these agencies, you may be required to provide information such as the following to the end user.

## F. Pictures

The pictures in this manual are for illustrative purposes only; your actual hardware may look slightly different.

## G. Interference and Attenuation

A phone may interfere with sensitive laboratory equipment, medical equipment, etc. Interference from unsuppressed engines or electric motors may cause problems.

## H. Electrostatic Sensitive Devices

## ATTENTION

Boards, which contain Electrostatic Sensitive Device (ESD), are indicated by the  sign. Following information is ESD handling:

- Service personnel should ground themselves by using a wrist strap when exchange system boards.
- When repairs are made to a system board, they should spread the floor with anti-static mat which is also grounded.
- Use a suitable, grounded soldering iron.
- Keep sensitive parts in these protective packages until these are used.
- When returning system boards or parts like EEPROM to the factory, use the protective package as described.

# 2. PERFORMANCE

## 2.1 System Overview

| Item | Specification |
|---|---|
| Shape | GSM900/1800/1900/EDGE and WCDMA2100 - Slide type Handset |
| Size | 96 X 45 X 17.9 mm |
| Weight | Under 97 g (with 900mAh Battery) |
| Power | 3.7 V normal, 900 mAh Li-Ion |
| Talk Time<br>with 1000mAh) | Over 160 min (WCDMA, Tx=12 dBm, Voice)<br>Over 160 min (GSM, Max Tx Power, Voice) |
| Standby Time<br>(with 1000mAh) | Over 200 Hrs (WCDMA, DRX=1.28)<br>Over 270 Hrs (GSM, Paging period=9) |
| Antenna | Internal type |
| LCD | Main 1.76" TFT, QCIF, 262K |
| LCD Backlight | White LED Back Light |
| Camera | 1.3 Mega pixel + VGA Video Call Camera |
| Vibrator | Yes ( Coin Type) |
| LED Indicator | No |
| MIC | Yes |
| Receiver | Yes |
| Earphone Jack | Yes (18 pin) |
| Connectivity | Bluetooth, USB |
| External Memory | Yes(Micro SD) |
| I/O Connect | 18 Pin |

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LGE Internal Use Only

# 2. PERFORMANCE

## 2.2 Usable environment

### 1) Environment

| Item | Specification |
|---|---|
| Voltage | 3.7 V(Typ), 3.2 V(Min), [Shut Down : 3.2 V] |
| Operation Temp | -20 ~ +60°C |
| Storage Temp | -20 ~ +70°C |
| Humidity | 85 % (Max) |

### 2) Environment (Accessory)

| Reference | Spec. | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| TA Power | Available power | 100 | 220 | 240 | Vac |

\* CLA : 12 ~ 24 V(DC)

## 2.3 Radio Performance

### 1) Transmitter - GSM Mode

| No | Item | | | GSM | | DCS & PCS | |
|---|---|---|---|---|---|---|---|
| 1 | Conducted Spurious Emission | MS allocated Channel | 100k~1GHz | | -39dBm | 9k ~ 1GHz | -39dBm |
| | | | | | | 1G~[A]MHz | -33dBm |
| | | | 1G~12.75GHz | | -33dBm | [A]M~[B]MHz | -39dBm |
| | | | | | | [B]M~12.75GHz | -33dBm |
| | | Idle Mode | 100k~880MHz | | -60dBm | 100k~880MHz | -60dBm |
| | | | 880M~915MHz | | -62dBm | 880M~915MHz | -62dBm |
| | | | 915M~1GHz | | -60dBm | 915M~1GHz | -60dBm |
| | | | 1G~[A]MHz | | -50dBm | 1G~[A]MHz | -50dBm |
| | | | [A]M~[B]MHz | | -56dBm | [A]M~[B]MHz | -56dBm |
| | | | [B]M~12.5GHz | | -50dBm | [B]M~12.5GHz | -50dBm |

\* In case of DCS : [A] -> 1710, [B] -> 1785          \* In case of PCS : [A] -> 1850, [B] -> 1910

| No | Item | | GSM | | DCS & PCS | |
|---|---|---|---|---|---|---|
| 2 | Radiated Spurious Emission | MS allocated Channel | 30M ~ 1GHz | -36dBm | 30M~1GHz | -36dBm |
| | | | | | 1G~[A]MHz | -30dBm |
| | | | 1G ~ 4GHz | -30dBm | [A]M~[B]MHz | -36dBm |
| | | | | | [B]M~4GHz | -30dBm |
| | | Idle Mode | 30M ~ 880MHz | -57dBm | 30M~880MHz | -57dBm |
| | | | 880M ~ 915MHz | -59dBm | 880M~915MHz | -59dBm |
| | | | 915M~1GHz | -57dBm | 915M~1GHz | -57dBm |
| | | | 1G~[A]MHz | -47dBm | 1G~[A]MHz | -47dBm |
| | | | [A]M~[B]MHz | -53dBm | [A]M~[B]MHz | -53dBm |
| | | | [B]M~4GHz | -47dBm | [B]M~4GHz | -47dBm |
| 3 | Frequency Error | | ±0.1ppm | | ±0.1ppm | |
| 4 | Phase Error | | ±5(RMS) | | ±5(RMS) | |
| | | | ±20(PEAK) | | ±20(PEAK) | |
| 5 | Frequency Error Under Multipath and Interference Condition | | 3dB below reference sensitivity | | 3dB below reference sensitivity | |
| | | | RA250 : ±200Hz | | RA250: ±250Hz | |
| | | | HT100 : ±100Hz | | HT100: ±250Hz | |
| | | | TU50 : ±100Hz | | TU50: ±150Hz | |
| | | | TU3 : ±150Hz | | TU1.5: ±200Hz | |
| 6 | Output RF Spectrum | Due to modulation | 0 ~ 100kHz | +0.5dB | 0 ~ 100kHz | +0.5dB |
| | | | 200kHz | -30dB | 200kHz | -30dB |
| | | | 250kHz | -33dB | 250kHz | -33dB |
| | | | 400kHz | -60dB | 400kHz | -60dB |
| | | | 600 ~ 1800kHz | -66dB | 600 ~ 1800kHz | -60dB |
| | | | 1800 ~ 3000kHz | -69dB | 1800 ~ 6000kHz | -65dB |
| | | | 3000 ~ 6000kHz | -71dB | ≥6000kHz | -73dB |
| | | | ≥6000kHz | -77dB | | |
| | | Due to Switching transient | 400kHz | -19dB | 400kHz | -22dB |
| | | | 600kHz | -21dB | 600kHz | -24dB |
| | | | 1200kHz | -21dB | 1200kHz | -24dB |
| | | | 1800kHz | -24dB | 1800kHz | -27dB |

**\*\* In case of DCS : [A] -> 1710, [B] -> 1785**     **\* In case of PCS : [A] -> 1850, [B] -> 1910**

# 2. PERFORMANCE

| No | Item | GSM | | | DCS & PCS | | |
|---|---|---|---|---|---|---|---|
| 7 | Intermodulation attenuation | | – | | Frequency offset | | 800kHz |
| | | | | | Intermodulation product should be Less than 55dB below the level of Wanted signal | | |
| 8 | Transmitter Output Power | Power control Level | Power (dBm) | Tolerance (dB) | Power control Level | Power (dBm) | Tolerance (dB) |
| | | 5 | 33 | ±3 | 0 | 30 | ±3 |
| | | 6 | 31 | ±3 | 1 | 28 | ±3 |
| | | 7 | 29 | ±3 | 2 | 26 | ±3 |
| | | 8 | 27 | ±3 | 3 | 24 | ±3 |
| | | 9 | 25 | ±3 | 4 | 22 | ±3 |
| | | 10 | 23 | ±3 | 5 | 20 | ±3 |
| | | 11 | 21 | ±3 | 6 | 18 | ±3 |
| | | 12 | 19 | ±3 | 7 | 16 | ±3 |
| | | 13 | 17 | ±3 | 8 | 14 | ±3 |
| | | 14 | 15 | ±3 | 9 | 12 | ±4 |
| | | 15 | 13 | ±3 | 10 | 10 | ±4 |
| | | 16 | 11 | ±5 | 11 | 8 | ±4 |
| | | 17 | 9 | ±5 | 12 | 6 | ±4 |
| | | 18 | 7 | ±5 | 13 | 4 | ±4 |
| | | 19 | 5 | ±5 | 14 | 2 | ±5 |
| | | | | | 15 | 0 | ±5 |
| 9 | Burst timing | Mask IN | | | Mask IN | | |

## 2) Transmitter - WCDMA Mode

| No | Item | Specification |
|----|------|---------------|
| 1 | Maximum Output Power | Class 3 : +24dBm(+1/-3dB) |
| 2 | Frequency Error | ±0.1ppm |
| 3 | Open Loop Power control in uplink | ±9dB@normal, ±12dB@extreme |
| 4 | Inner Loop Power control in uplink | Adjust output(TPC command) |
| | | cmd    1dB     2dB     3dB |
| | | +1    +0.5/1.5    +1/3    +1.5/4.5 |
| | | 0    -0.5/+0.5  -0.5/+0.5  -0.5/+0.5 |
| | | -1    -0.5/-1.5   -1/-3   -1.5/-4.5 |
| | | Group (10 equel command group) |
| | | +1    +8/+12    +16/+24 |
| 5 | Minimum Output Power | -50dBm(3.84MHz) |
| 6 | Out-of-synchronization handling of output power | Qin/Qout : PCCH quality levels<br>Toff@DPCCH/Ior : -22 -> -28dB<br>Ton@DPCCH/Ior : -24 -> -18dB |
| 7 | Transmit OFF Power | -56dBm(3.84MHz) |
| 8 | Transmit ON/OFF Time Mask | ±25us<br>PRACH,CPCH,uplinlk compressed mode |
| 9 | Change of TFC | ±25us<br>Power varies according to the data rate<br>DTX : DPCH off<br>(minimize interference between UE) |
| 10 | Power setting in uplink compressed | ±3dB(after 14slots transmission gap) |
| 11 | Occupied Bandwidth(OBW) | 5MHz(99%) |
| 12 | Spectrum emission Mask | $-35-15*(\Delta f-2.5)$dBc@$\Delta f$=2.5~3.5MHz,30k<br>$-35-1*(\Delta f-3.5)$dBc@$\Delta f$=3.5~7.5MHz,1M<br>$-39-10*(\Delta f-7.5)$dBc@$\Delta f$=7.5~8.5MHz,1M<br>$-49$dBc@$\Delta f$=8.5~12.5MHz,1M |

# 2. PERFORMANCE

| No | Item | Specification |
|----|------|---------------|
| 13 | Adjacent Channel Leakage Ratio(ACLR) | 33dB@5MHz, ACP>-50dBm<br><br>43dB@10MHz, ACP>-50dBm |
| 14 | Spurious Emissions<br>(*: additional requirement) | -36dBm@f=9~150KHz, 1K BW<br><br>-36dBm@f=50KHz~30MHz, 10K BW<br><br>-36dBm@f=30MHz~1000MHz, 100K BW<br><br>-30dBm@f=1~12.5GHz, 1M BW<br><br>(*)-41dBm@f=1893.5~1919.6MHz, 300K<br><br>(*)-67dBm@f=925~935MHz, 100K BW<br><br>(*)-79dBm@f=935~960MHz, 100K BW<br><br>(*)-71dBm@f=1805~1880MHz, 100K BW |
| 15 | Transmit Intermodulation | -31dBc@5MHz,Interferer -40dBc<br><br>-41dBc@10MHz, Interferer -40dBc |
| 16 | Error Vector Magnitude (EVM) | 17.5%(>-20dBm)<br><br>(@12.2K, 1DPDCH+1DPCCH) |
| 17 | Transmit OFF Power | -15dB@SF=4.768Kbps, Multi-code<br><br>transmission |

## 3)Receiver - GSM Mode

| No | Item | | GSM | DCS & PCS |
|----|------|---|-----|-----------|
| 1 | Sensitivity (TCH/FS Class II) | | -105dBm | -105dBm |
| 2 | Co-Channel Rejection<br>(TCH/FS Class II, RBER, TU high/FH) | | C/Ic=7dB | Storage -30 ~ +85 |
| 3 | Adjacent Channel<br>Rejection | 200kHz | C/Ia1=-12dB | C/Ia1=-12dB |
|  |  | 400kHz | C/Ia2=-44dB | C/Ia2=-44dB |
| 4 | Intermodulation Rejection | | Wanted Signal :-98dBm 1st<br>interferer:-44dBm 2nd<br>interferer:-45dBm | Wanted Signal :-96dBm 1st<br>interferer:-44dBm 2nd<br>interferer:-44dBm |
| 5 | Blocking Response<br>(TCH/FS Class II, RBER) | | Wanted Signal :-101dBm<br>Unwanted : Depend on Frequency | Wanted Signal :-101dBm<br>Unwanted : Depend on Frequency |

## 5) Receiver - WCDMA Mode

| No | Item | Specification |
|---|---|---|
| 1 | Reference Sensitivity Level | -106.7 dBm(3.84 MHz) |
| 2 | Maximum Input Level | -25dBm(3.84MHz)<br>-44dBm/3.84MHz(DPCH_Ec)<br>UE@+20dBm output power(Class3) |
| 3 | Adjacent Channel Selectivity (ACS) | 33dB<br>UE@+20dBm output power(Class3) |
| 4 | In-band Blocking | -56dBm/3.84MHz@10MHz<br>UE@+20dBm output power(Class3) |
| | | -44dBm/3.84MHz@15MHz<br>UE@+20dBm output power(Class3) |
| 5 | Out-band Blocking | -44dBm/3.84MHz@f=2050~2095 and 2185~2230MHz<br>UE@+20dBm output power(Class3) |
| | | -30dBm/3.84MHz@f=2025~2050 and 2230~2255MHz<br>UE@+20dBm output power(Class3) |
| | | -15dBm/3.84MHz@f=1~2025 and 2255~12500MHz<br>UE@+20dBm output power(Class3) |
| 6 | Spurious Response | -44dBm CW<br>UE@+20dBm output power(Class3) |
| 7 | Intermodulation Characteristic | -46dBm CW@10MHz<br>-46dBm/3.84MHz@20MHz<br>UE@+20dBm output power(Class3) |
| 8 | Spurious Emissions | -57dBm@f=9KHz~1GHz, 100K BW<br>-47dBm@f=1~12.5GHz, 1M BW<br>-60dBm@f=1920MHz~1980MHz, 3.84M BW<br>-60dBm@f=2110MHz~2170MHz, 3.84M BW |

# 2. PERFORMANCE

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## 2.4 Current Consumption

### 1) KU380 Current Consumption

|  | Stand by | Voice Call | VT |
|---|---|---|---|
| **WCDMA** | Under 4.5 mA (DRX=1.28) | Under 350 mA (Tx=12dBm) | Under 410mA (Tx=12dBm) |
| GSM | Under 3.3 mA Paging=9 period | Under 350 mA (Max Tx Power) | |

(Stand by and Voice Call Test Condition : Bluetooth off, LCD backlight off,Neighbor Cell off) (VT Test Condition : Speaker off, LCD backlight On)

## 2.5 RSSI BAR

| Level Change | WCDMA | GSM |
|---|---|---|
| BAR 4 → 3 | -85 ± 2 dBm | -91 ± 2 dBm |
| BAR 3 → 2 | -95 ± 2 dBm | -96 ± 2 dBm |
| BAR 2 → 1 | -106 ± 2 dBm | -101 ± 2 dBm |
| BAR 1 → 0 | -111 ± 2 dBm | -106 ± 2 dBm |

## 2.6 Battery BAR

| Indication | Standby |
|---|---|
| Bar 4 | Over 3.83 ± 0.05V |
| Bar 4 → 3 | 3.82 ± 0.05V |
| Bar 3 → 2 | 3.73 ± 0.05V |
| Bar 2 → 1 | 3.68 ± 0.05V |
| Bar 1 → Empty | 3.58 ± 0.05V |
| Low Voltage, Warning message+ Blinking | 3.58 ± 0.05V (Stand-by) / 3.58 ± 0.05V (Talk) [Interval : 3min(Stand-by) / 1min(Talk)] |
| Power Off | 3.20 ± 0.05V |

## 2.7 Sound Pressure Level

| No | Test Item | | Specification | |
|---|---|---|---|---|
| 1 | Sending Loudness Rating (SLR) | MS | 8 ±3 dB | |
| 2 | Receiving Loudness Rating (RLR) | | Nor | -4 ± 3 dB |
| | | | Max | -15 ± 3 dB |
| 3 | Side Tone Masking Rating (STMR) | | Min | 17 dB |
| 4 | Echo Loss (EL) | | Min | 40 dB |
| 5 | Idle Noise-Sending (INS) | | Max | -64 dBm0p |
| 6 | Idle Noise-Receiving (INR) | | Nor | Under -47 dBPA |
| | | | Max | Under -36 dBPA |
| 7 | Sending Loudness Rating (SLR) | Headset | 8±3dB | |
| 8 | Receiving Loudness Rating (RLR) | | Nor | -1 ±3 dB |
| | | | Max | -12 ±3 dB |
| 9 | Side Tone Masking Rating (STMR) | | Min | 25 dB |
| 10 | Echo Loss (EL) | | Min | 40 dB |
| 11 | Idle Noise-Sending (INS) | | Max | -55 dBm0p |
| 12 | Idle Noise-Receiving (INR) | | Nor | Under -45 dBPA |
| | | | Max | Under -40 dBPA |
| 13 | TDMA Noise<br>-. GSM : Power Level : 5<br>DCS/PCS : Power Level : 0<br>(Cell Power : -90 ~ -105 dBm)<br><br>-. Acoustic (Max Vol.)<br>MS/Headset SLR : 8 ± 3dB<br>MS/Headset RLR : -15 ± 3dB/-12dB<br>(SLR/RLR : Mid-value setting) | MS and Headset | Max | Under -62 dBm |

## 2.8 Charging

· Charging Method : CC & CV (Constant Current and Constant Voltage)

· Maximum Charging Voltage : 4.2 V

· Maximum Charging Current : 600 mA

· Normal Battery Capacity : 900 mAh

· Charging Time : Max 3.5 hours (except for trickle charging time)

· Full charging indication current (charging icon stop current) : 100 mA

· Cut-off voltage : 3.20 V

# 3. TECHNICAL BRIEF

## 3.1 General Description

The KU380 supports UMTS-2100, GSM-900, DCS-1800, and PCS-1900 based GSM/GPRS/UMTS. All receivers and the UMTS transmitter use the radioOne[1]Zero-IF architecture to eliminate intermediate frequencies, directly converting signals between RF and baseband. The quad-band GSM transmitters use a baseband-to-IF upconversion followed by an offset phase-locked loop that translates the GMSK-modulated signal to RF.
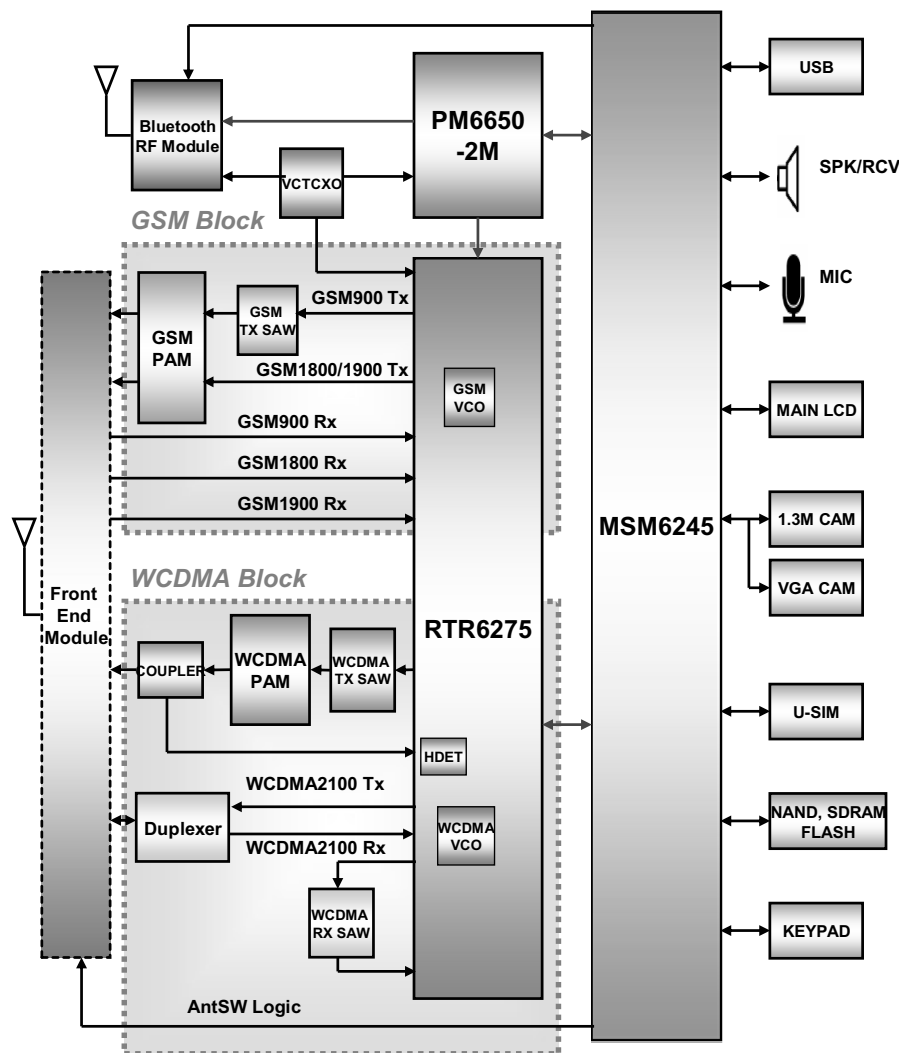


**[Fig 1.1] Block diagram of RF part**

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[1] QUALCOMM's branded chipset that implements a Zero-IF radio architecture.

# 3. TECHNICAL BRIEF

A generic, high-level functional block diagram of KU380 is shown in Figure 1-1. One antenna collects base station forward link signals and radiates handset reverse link signals. The antenna connects with receive and transmit paths through a FEM(Front End Module).

The UMTS receive path each include a LNA, a RF band-pass filter, and a downconverter that translate the signal directly from RF-to-baseband using radioOne ZIF technique. The RFIC Rx analog baseband outputs, for the receive chains, connect to the MSM IC. The UMTS and GSM Rx baseband outputs share the same inputs to the MSM IC.

For the transmit chains, the RTR6275 IC directly translates the Tx baseband signals (from the MSM device) to an RF signal using an internal LO generated by integrated on-chip PLL and VCO. The RTR6275 IC outputs deliver fairly high-level RF signals that are first filtered by Tx SAWs and then amplified by their respective UMTS PA. The high- and low-band UMTS RF transmit signals emerge from the RTR6275 transceiver.

In the GSM receive paths, the received RF signals are applied through their band-pass filters and down-converted directly to baseband in the RTR6275 transceiver IC. These baseband outputs are shared with the UMTS receiver and routed to the MSM IC for further signal processing.

The GSM transmit paths employ one stage of up-conversion and, in order to improve efficiency.

1. The on-chip quadrature up-converter translates the GMSK-modulated signal to a constant envelope phase signal at RF;

2. The amplitude-modulated (AM) component is applied to the ramping control pin of power amplifier from a DAC within the MSM

KU380 power supply voltages are managed and regulated by the PM6650 Power Management IC. This versatile device integrates all wireless handset power management, general housekeeping, and user interface support functions into a single mixed signal IC. It monitors and controls the external power source and coordinates battery recharging while maintaining the handset supply voltages using low dropout, programmable regulators.

The device's general housekeeping functions include an ADC and analog multiplexer circuit for monitoring on-chip voltage sources, charging status, and current flow, as well as userdefined off-chip variables such as temperature, RF output power, and battery ID. Various oscillator, clock, and counter circuits support IC and higher-level handset functions. Key parameters such as under-voltage lockout and crystal oscillator signal presence are monitored to protect against detrimental conditions.

## 3.2 GSM Mode

### 3.2.1 GSM Receiver

The Dual-mode KU380's receiver functions are split among the three RFIC's as follows:

· GSM-900, DCS-1800, and PCS-1900 UMTS-2100 modes use the RTR6275 IC only. Each mode has independent front-end circuits and down-converters, but they share common baseband circuits (with only one mode active at a time). All receiver control functions are beginning with SBI2-controlled parameters.

RF Front end consists of antenna, antenna switch module(D5011) which includes three RX saw filters(GSM900, DCS and PCS). The antenna switch module allows multiple operating bands and modes to share the same antenna. In KU380, a common antenna connects to one of six paths: 1) UMTS-2100 Rx/Tx, 2) GSM-900 Rx, 3) GSM-900 Tx, 4) DCS-1800 Rx, and 5) DCS-1800 Tx, PCS-1900 Tx(High Band Tx's share the same path), 6) PCS-1900 Rx. UMTS operation requires simultaneous reception and transmission, so the UMTS Rx/Tx connection is routed to a duplexer that separates receive and transmit signals. The GSM900, DCS, and PCS operation is time division duplexed, so only the receiver or transmitter is active at any time and a frequency duplexer is not required.

|  | ANT_SEL0 | ANT_SEL1 |
|---|---|---|
| GSM 1800/GSM 1900 RX | LOW | LOW |
| GSM 850/ GSM 900 RX | HIGH | LOW |
| GSM 850/GSM 900 TX/ WCDMA | LOW | HIGH |
| GSM 1800/GSM 1900 TX | HIGH | HIGH |

**[Table 1.1] Antenna Switch Module Control logic**

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[2] The RFIC operating modes and circuit parameters are MSM-controlled through the proprietary 3-line Serial Bus Interface (SBI). The Application Programming Interface (API) is used to implement SBI commands. The API is documented in AMSS Software - please see applicable AMSS Software documentation for details.
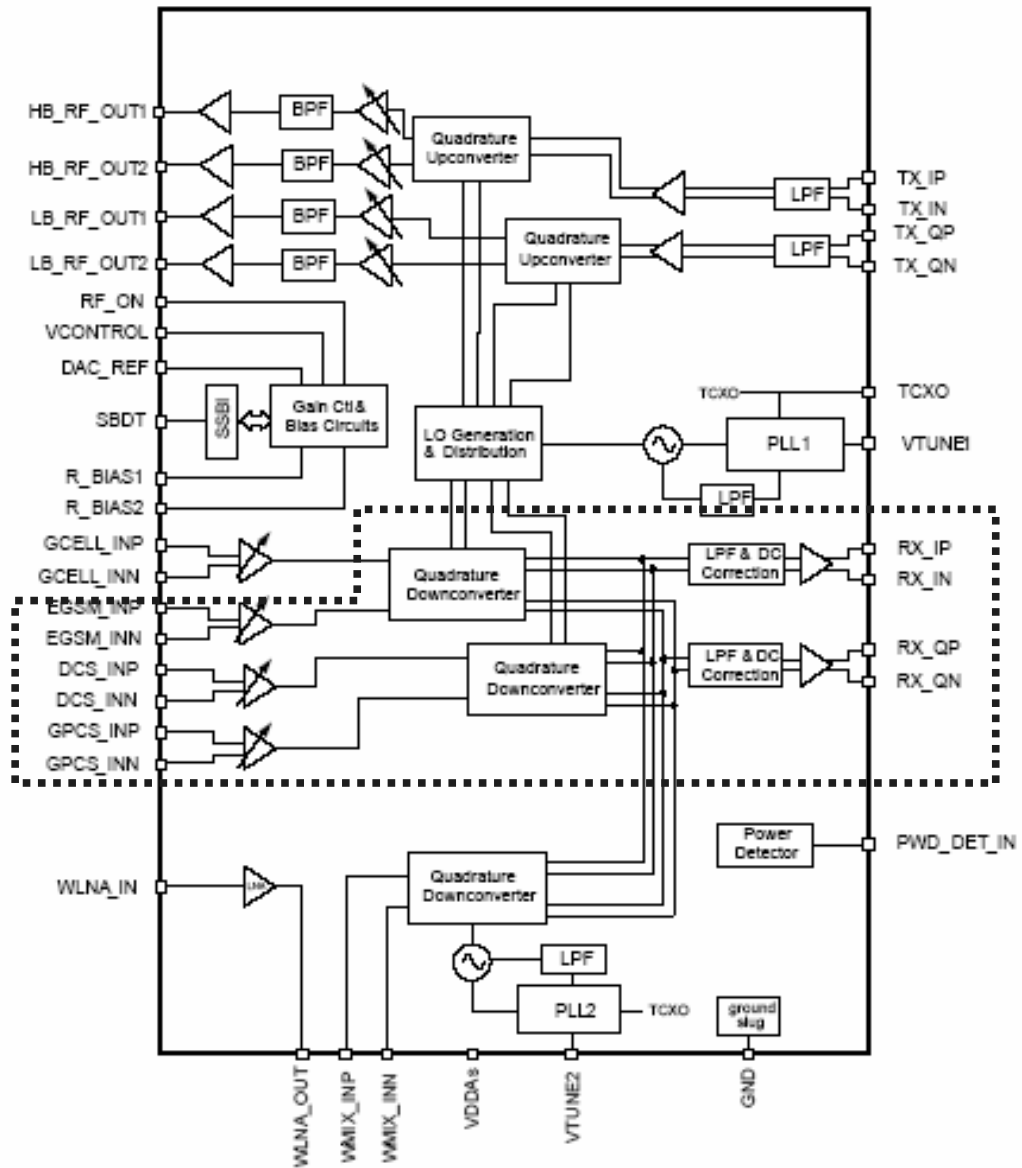
# 3. TECHNICAL BRIEF

The GSM900, DCS, and PCS receiver inputs of RTR6275 are connected directly to the transceiver front-end circuits(filters and antenna switch module). The GSM900, DCS, and PCS receiver inputs use differential configurations to improve common-mode rejection and second-order non-linearity performance. The balance between the complementary signals is critical and must be maintained from the RF filter outputs all the way into the IC pins

Since GSM900, DCS, and PCS signals are time-division duplex (the handset can only receive or transmit at one time), switches are used to separate Rx and Tx signals in place of frequency duplexers - this is accomplished in the switch module.

The GSM900, DCS, and PCS receive signals are routed to the RTR6275 through band selection filters and matching networks that transform single-ended 50-Ω. sources to differential impedances optimized for gain and noise figure. The RTR input uses a differential configuration to improve second-order inter-modulation and common mode rejection performance. The RTR6275 input stages include MSM-controlled gain adjustments that maximize receiver dynamic range.

The amplifier outputs drive the RF ports of the quadrature RF-to-baseband downconverters. The downconverted baseband outputs are multiplexed and routed to lowpass filters (one I and one Q) having passband and stopband characteristics suitable for GMSK processing. These filter circuits include DC offset corrections. The filter outputs are buffered and passed on to the MSM6245 IC for further processing (an interface shared with the RFR6275 UMTS receiver outputs).

**[Fig 1.2] RTR6275 RX feature**

# 3. TECHNICAL BRIEF

## 3.2.2 GSM Transmitter

The RTR6275 transmitter outputs(DA_HB2_OUT and DA_LB1_OUT)include on-chip output matching inductors. The 50ohm output impedance is achieved by adding a series capacitor at the output pins. The capacitor value may be optimized for specific applications and PCB characteristics based on pass-band symmetry about the band center frequency, the suggested starting value is shown in Figure1.2.
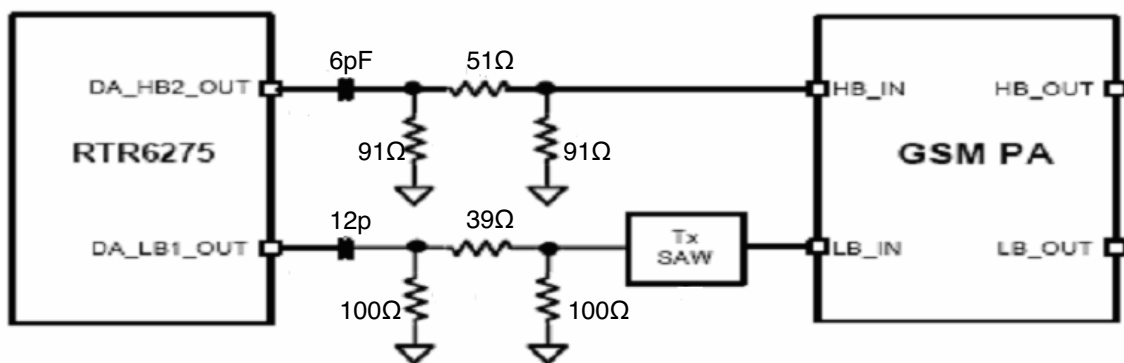


**[Fig 1.3] GSM Transmitter matching**

The RTR6275 IC is able to support GSM 900 and GSM 1800/1900 mode transmitting. This design guideline shows a tri-band GSM application.

Both high-band and low band outputs are followed by resistive pads to ensure that the load presented to the outputs remains close to 50ohm. The low-band GSM Tx path also includes a Tx-band SAW filter to remove noise-spurious components and noise that would be amplified by the PA and appear in the GSM Rx band

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## 3.3 UMTS Mode

### 3.3.1 Receiver

The UMTS duplexer receiver output is routed to LNA circuits within the RTR6275 device. The UMTS Rx input is provided with an on-chip LNA that amplifies the signal before a second stage filter that provides differential downconverter. This second stage input is configured differentially to optimize second-order intermodulation and common mode rejection performance. The gain of the UMTS frontend amplifier and the UMTS second stage differential amplifier are adjustable, under MSM control, to extend the dynamic range of the receivers. The second stage UMTS Rx amplifiers drive the RF ports of the quadrature RF-tobaseband downconverters. The downconverted UMTS Rx baseband outputs are routed to lowpass filters having passband and stopband characteristics suitable for UMTS Rx processing. These filter circuits allow DC offset corrections, and their differential outputs are buffered to interface shared with GSM Rx to the MSM IC. The UMTS baseband outputs are turned off when the RTR6275 is downconverting GSM signals and on when the UMTS is operating.

### 3.3.2 Transmitter

The UMTS Tx path begins with differential baseband signals (I and Q) from the MSM device. These analog input signals are amplified, filtered, and applied to the quadrature up-converter mixers. The up-converter output is amplified by multiple variable gain stages that provide transmit AGC control. The AGC output is filtered and applied to the driver amplifier; this output stage includes an integrated matching inductor that simplifies the external matching network to a single series capacitor to achieve the desired 50-$\Omega$ interface.

The RTR6275 UMTS output is routed to its power amplifier through a bandpass filter, and delivers fairly high-level signals that are filtered and applied to the PA. Transmit power is delivered from the duplexer to the antenna through the switch module.

The transceiver LO synthesizer is contained within the RTR6275 IC with the exception of the off-chip loop filter components and the VC-TCXO. This provides a simplified design for multimode applications. The PLL circuits include a reference divider, phase detector, charge pump, feedback divider, and digital logic generator.

UMTS Tx using PLL1, the LO generation and distribution circuits create the necessary LO signals for different frequency converters. The UMTS transmitter also employs the ZIF architecture to translate the signal directly from baseband to RF. This requires $F_{LO}$ to equal $F_{RF}$, and the RTR6275 IC design achieves this without allowing $F_{VCO}$ to equal $F_{RF}$.

The RTR6275 IC is able to support UMTS 2100/1900 and UMTS 850 mode transmitting. This design guideline shows only UMTS 2100 applications.

# 3. TECHNICAL BRIEF



**WCDMA_2100_TX**

**WCDMA_2100_RX**
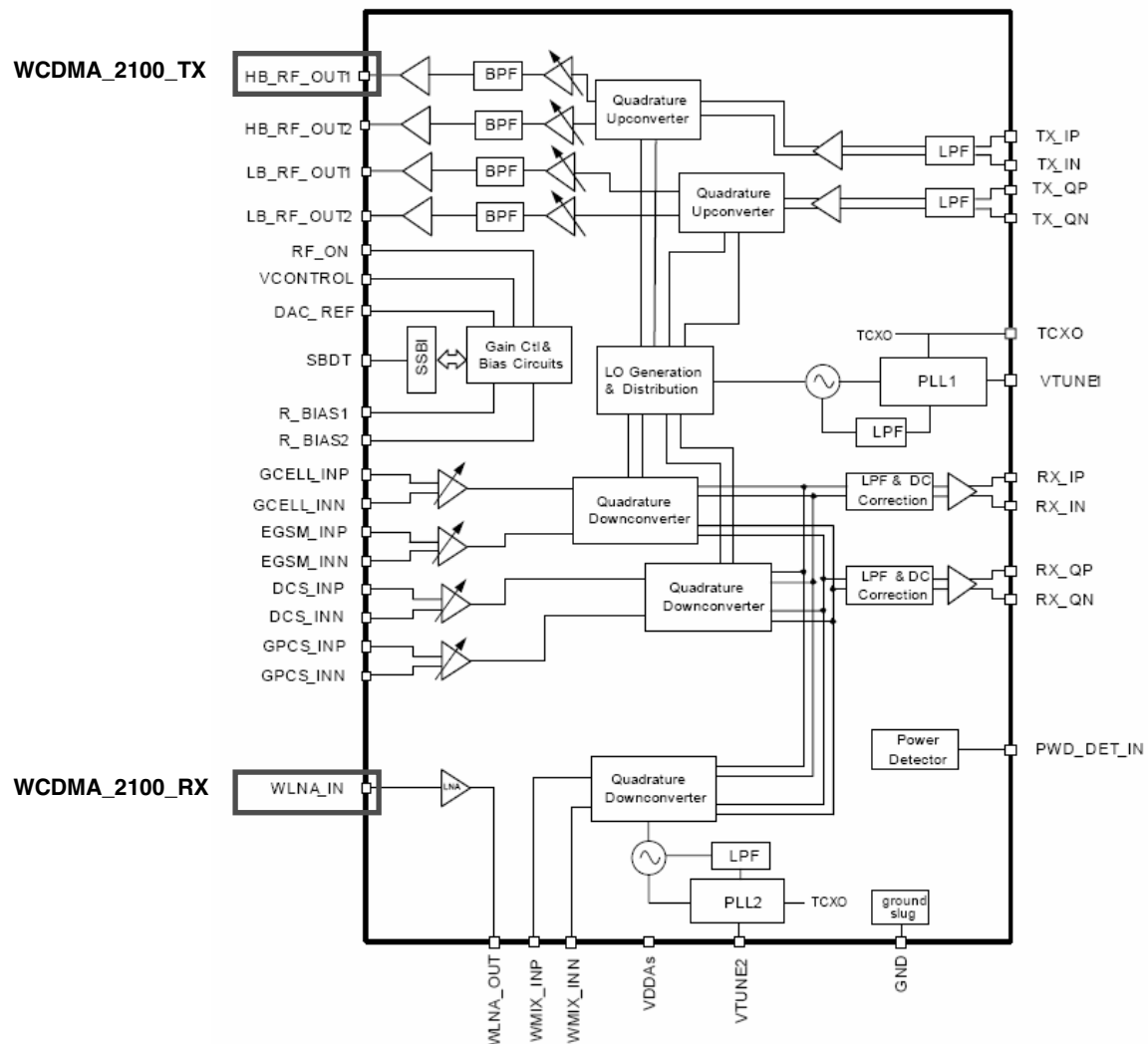
[Figure 1.4] RTR6275 IC functional block diagram

## 3.4 LO generation and distribution circuits

The integrated LO generation and distribution circuits are driven by internal VCOs to support various modes to yield highly flexible quadrature LO outputs that drive all GSM and UMTS band upconverters and downconverters; with the help of these LO generation and distribution circuits, zero-IF architecture is employed in all GSM and UMTS band receivers and transmitters to translate the signal directly from RF to baseband and from baseband to RF.

Two fully functional fractional-N synthesizers, including VCOs and loop filters, are integrated within the RTR6275 IC. The first synthesizer (PLL1) creates the transceiver LOs that support the UMTS 2100/1900/1800 transmitter, and all four GSM band receivers and transmitters including: GSM 850, GSM 900, GSM 1800, and GSM 1900. The second synthesizer (PLL2) provides the LO for the UMTS 2100/1900/1800 receiver. An external TCXO input signal is required to provide the synthesizer frequency reference to which the PLL is phase and frequency locked. The RTR6275 IC integrates most of PLL loop filter components on-chip except two off-chip loop filter series capacitors, and significantly reduces off-chip component requirement. With the integrated fractional-N PLL synthesizers, the RTR6275 has the advantages of more flexible loop bandwidth control, fast lock time, and low-integrated phase error

## 3.5 Off-chip RF Components

### 3.5.1 WCDMA PAM (U104: AWT6277R)

The UMTS PA output power is monitored by l power detector circuits(U101 : RTR6275) .
This detector voltage can be used for transmitter calibration and monitor to meet RF system
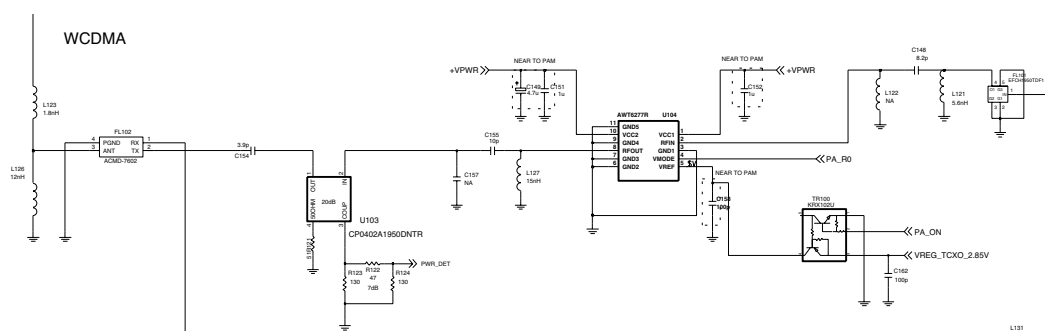


[Figure 1.5] WCDMA PAM, Duplexer, Coupler

## 3.5.2 VCTCXO (X100 : DSA321SCE-19.2M)

The Voltage Controlled Temperature Compensated Crystal Oscillator (VCTCXO) provides the reference frequency for all RFIC synthesizers as well as clock generation functions within the MSM6245 IC. The oscillator frequency is controlled by the MSM6245 IC.
TRK_LO_ADJ pulse density modulated signal in the same manner as the transmit gain control TX_AGC_ADJ. A two-pole RC lowpass filter is recommended on this control line.

The PM6650 IC controls the handset power-up sequence, including a special VCTCXO warm-up interval before other circuits are turned on. This warm-up interval (as well as other TCXO controller functions) is enabled by the MSM TCXO_EN line . The PM6650 IC VREG_TCXO regulated output voltage is used to power the VCTCXO and is enabled before most other regulated outputs.
Any GSM mode power control circuits within the MSM6245 IC require a reference voltage for proper operation and sufficient accuracy. Connecting the PM6650 IC REF_OUT directly to the MSM6245 IC GSM_PA_PWR_CTL_REF provides this reference. This sensitive analog signal needs a 0.1 $\mu$F low frequency filter near to MSM side, and isolate from digital logic and clock traces with ground on both sides, plus ground above and below if routed on internal layers.

## 3.5.3 Front-End Module (U100 : D5011)

This equipment uses a single antenna to support all handset operating modes, with an antenna switch module select the operating frequency and band. UMTS operation requires simultaneous reception and transmission, so the UMTS Rx/Tx connection is routed to a duplexer that separates receive and transmit signals. The active connection is MSM-selected by three control lines (GPIO[9], GPIO[10]). Two GPIO are programmed to be ANT_SEL0_N, ANT_SEL1_N) respectively.

|  | ANT_SEL0 | ANT_SEL1 |
|---|---|---|
| GSM 1800/GSM 1900 RX | LOW | LOW |
| GSM 850/ GSM 900 RX | HIGH | LOW |
| GSM 850/GSM 900 TX/ WCDMA | LOW | HIGH |
| GSM 1800/GSM 1900 TX | HIGH | HIGH |

[Table 1.2] Front End Module control logic

## 3.5.4 PMIC Functional Block Diagram (U300 : PM6650-2M)

• Input power management

  - Valid external supply attachment and removal detection
  - Supports unregulated (closed-loop) external charger supplies and USB supplies as input power sources
  - Supports lithium-ion main batteries
  - Trickle, constant current, constant voltage, and pulsed charging of the main battery
  - Supports coin cell backup battery (including charging)
  - Battery voltage detectors with programmable thresholds
  - VDD collapse protection
  - Charger current regulation and real-time monitoring for over-current protection
  - Charger transistor protection by power limit control
  - Control drivers for two external pass transistors and one external battery MOSFET MOSFET is optional
  - Voltage, current, and power control loops
  - Automated recovery from sudden momentary power loss

• Output voltage regulation

  - One boost (step-up) switched-mode power supply (SMPS) for driving white LEDs and hosting USBOTG
  - Three buck (step-down) switched-mode power supplies that efficiently generate MSMC, MSME, and PA (or second MSMC) supply voltages
  - Supports dynamic voltage scaling (DVS) for MSMC and PA
  - Eleven low dropout regulator circuits with programmable output voltages, implemented using three different current ratings: 300 mA (two), 150 mA (six), and 50 mA (three). These can be used to power MSMA, MSMP, RFRX1, RFRX2, RFTX, SYNT, TCXO, WLAN, MMC, USB, and RUIM circuits.
  - All regulators can be individually enabled/disabled for power savings
  - Low power mode available on MSMA and MSMP regulators
  - All regulated outputs are derived from a common bandgap reference - close tracking

• Integrated handset-level housekeeping functions reduces external parts count, size, cost

  - Analog multiplexer selects from 8 internal and up to 18 external inputs
  - Multiplexer output's offset and gain are adjusted, increasing the effective ADC resolution
  - Adjusted multiplexer output is buffered and routed to an MSM device ADC
  - Dual oscillators - 32.768 kHz off-chip crystal and on-chip RC assures MSM device sleep clock
  - Crystal oscillator detector and automated switch-over upon lost oscillation
  - Real time clock for tracking time and generating associated alarms
  - On-chip adjustments minimize crystal oscillator frequency errors
  - Circuits control TCXO warm-up and synchronize, deglitch, and buffer the TCXO signal
  - TCXO buffer control for optimal QPH/catnap timing
  - Three-stage over-temperature protection (smart thermal control)

• Integrated handset-level user interfaces

  - Four programmable current sinks recommended as keypad backlight, LCD backlight, camera flash, and general-purpose drivers
  - Vibration motor driver programmable from 1.2 to 3.1V in 100 mV increments
  - Speaker driver with programmable gain, turn-on time, and muting; differential operation (drives external l8 Ω speakers with volume controlled 500 mW)

# 3. TECHNICAL BRIEF

- IC-level interfaces
  - MSM device-compatible 3-line SBI for efficient initialization, status, and control
  - Supports the MSM device's interrupt processing with an internal interrupt manager
  - Many functions monitored and reported through real-time and interrupt status signals
  - Dedicated circuits for controlled power-on sequencing, including the MSM device's reset signal
  - Several events continuously monitored for triggering power-on/power-off sequences
  - Supports and orchestrates soft resets
  - USB-OTG transceiver for full-speed (12 Mb/s) and low speed (1.5 Mb/s) interfacing of the MSM device to computers as a USB peripheral, or connecting the MSM device to other peripherals
  - RUIM level translators enable MSM device interfacing with external modules

- Twelve multi-purpose pins that can be configured as digital or analog I/Os, bi-directional I/Os, or current sinks. Default functions support the RUIM level translators, power-on circuits, analog multiplexer inputs, an LED driver, and a reference voltage buffer.

- Highly integrated functionality in a small package - 84-pin BCCS with a large center slug for electrical ground, mechanical stability, and thermal relief.
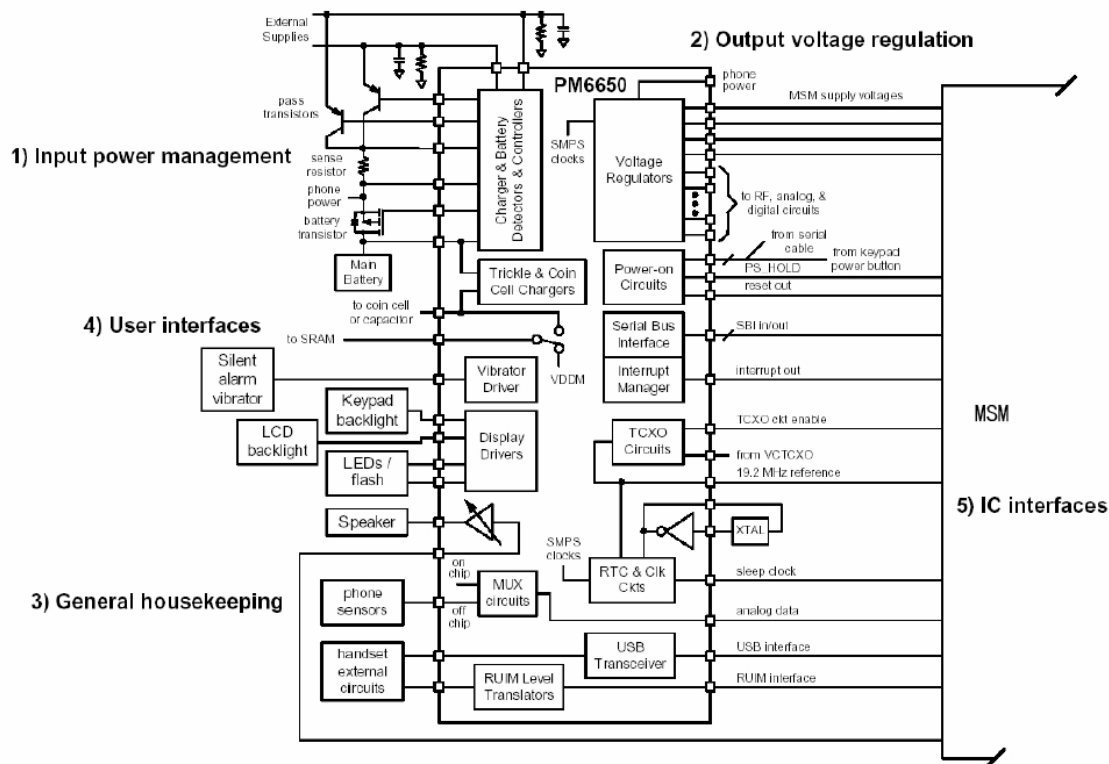


**[Figure 1.6] MSM6245 Interface**
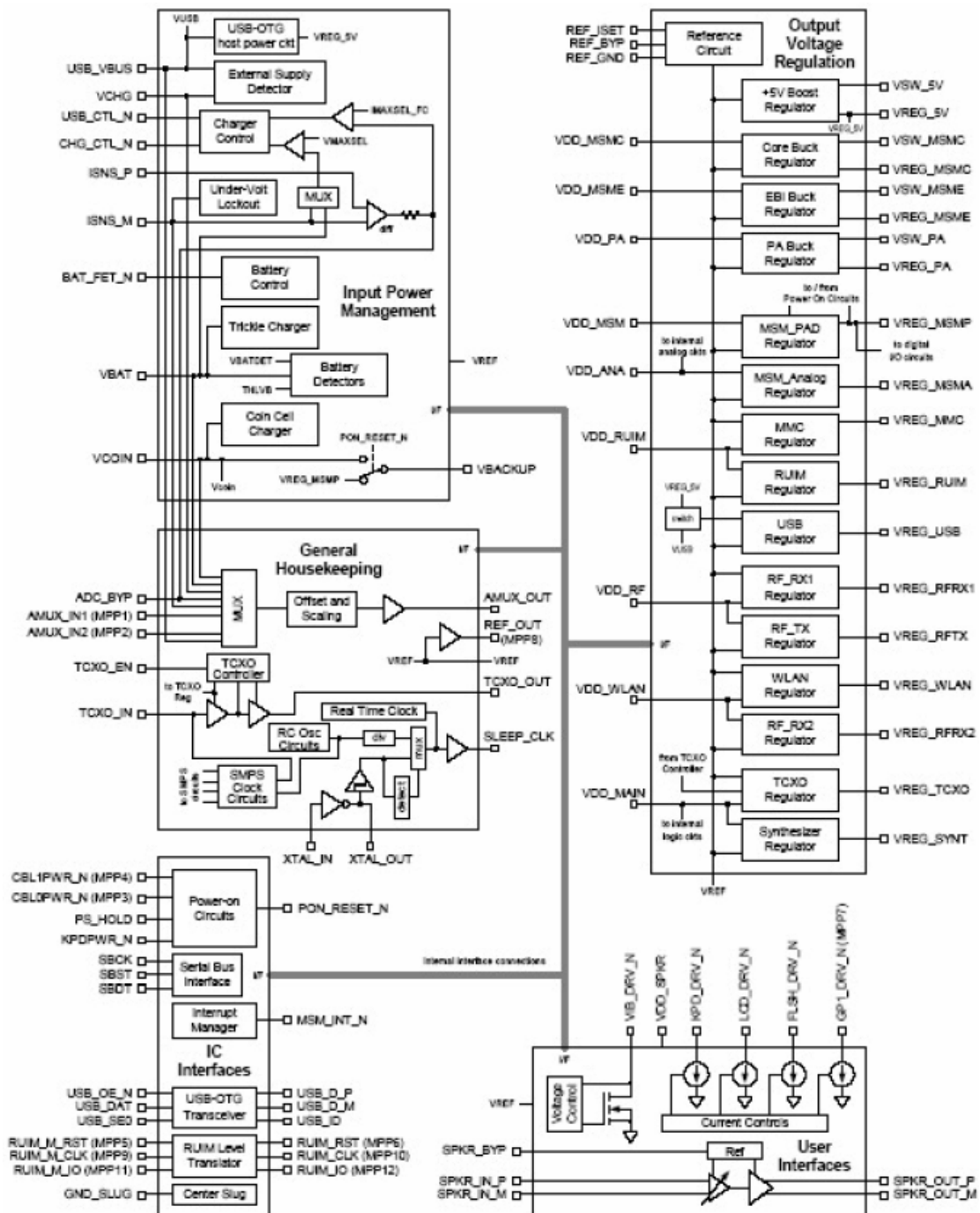
[Figure1.7] PM6650 Block Diagram

# 3. TECHNICAL BRIEF

## 3.5.5 GSM PAM (U102 : SKY77329)

The SKY77329 Power Amplifier Module (PAM) is designed in a compact form factor for quad-band cellular handsets comprising GSM850/900, DCS1800, PCS1900, and supports Class 12 General Packet Radio Service (GPRS) multi-slot operation.

The module consists of a GSM850/900 PA block and a DCS1800/PCS1900 PA block, impedance matching circuitry for 50 Ω input and output impedances, and a Power Amplifier Control (PAC) block. A custom CMOS integrated circuit provides the internal PAC function and interface circuitry.

Two separate Heterojunction Bipolar Transistor (HBT) PA blocks are fabricated onto InGaP/GaAs die; one supports the GSM850/900 bands, the other supports the DCS1800 and PCS1900 bands. Both PA blocks share common power supply pins to distribute current. The GaAs die, the silicon die, and the passive components are mounted on a multi-layer laminate substrate and the entire assembly is encapsulated with plastic overmold.
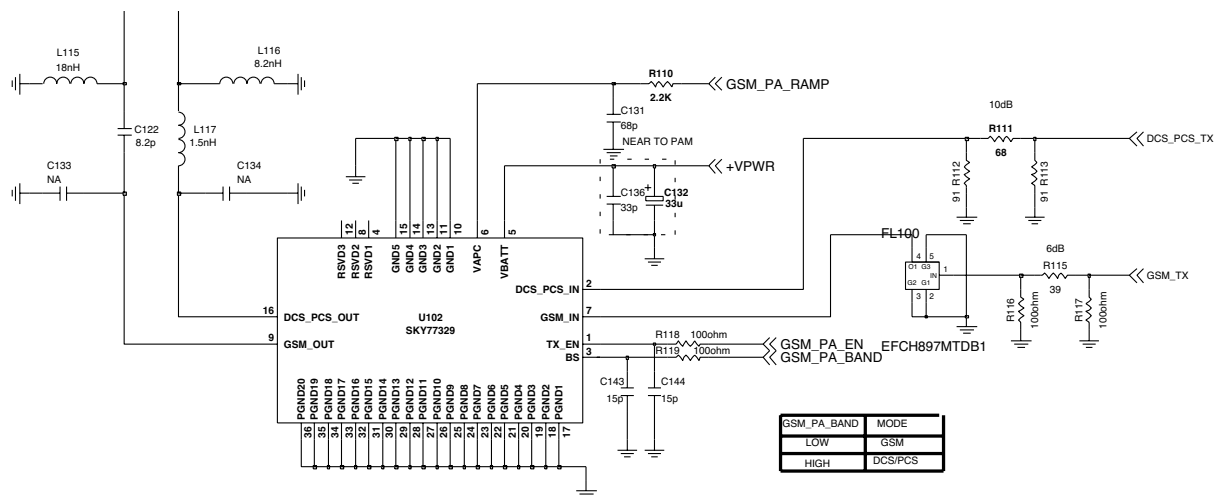


[Figure 1. 8] GSM PAM Schematic

## 3.5.6 UMTS Duplexer(FL102:ACMD-7602)

A UMTS duplexer splits a single operating band into receive and transmit paths. Important performance requirements include;

· Insertion loss . this component is also in the receive and transmit paths ;
In the KU380 typical losses : UMTS2100_ Tx = 1.2 dB, UMTS2100_ Rx = 1.4 dB

· Out-of-band rejection or attenuation. the duplexer provides input selectivity for the receiver, output filtering for the transmitter, and isolation between the two. Rejection levels for both paths are specified over a number of frequency ranges. Two Tx-to-Rx isolation levels are critical to receiver performance:

· Rx-band isolation. the transmitter is specified for out-of-band noise falling into the Rx band. This noise leaks from the transmit path into the receive path, and must be limited to avoid degrading receiver sensitivity. The required Rx-band isolation depends on the PA out of-band noise levels and Rx-band losses between the PA and LNA. Minimum duplexer Rx band isolation value is about 51 dB.

· Tx-band isolation the transmit channel power also leaks into the receiver. In this case, the leakage is outside the receiver passband but at a relatively high level. It combines with Rx band jammers to create cross-modulation products that fall in-band to desensitize the receiver. The required Tx-band isolation depends on the PA channel power and Tx-band losses between the PA and LNA. Minimum duplexer Tx-band isolation value is about 58dB.

· Passband ripple the loss of this fairly narrowband device is not flat across its passband. Passband ripple increases the receive or transmit insertion loss at specific frequencies, creating performance variations across the band.s channels, and should be controlled.

· Return loss . minimize mismatch losses with typical return losses of 10 dB or more (VSWR <2:1).

· Power handling high power levels in the transmit path must be accommodated without degraded performance. The specified level depends on the operating band class and mobile station class (per the applicable standard), as well as circuit losses and antenna EIRP. Several duplexer characteristics depend upon its source and load impedances. QUALCOMM strongly recommends an isolator be used between the UMTS PA and duplexer to assure proper performance.

## 3.5.7 UMTS Rx RF filter (FL103 : EFCH2140TDE1)

■ Frequency range : 2110 ~ 2170MHz

An RF filter is located between the UMTS LNA and mixer. Insertion loss is important, but not as critical as losses before the LNA. The most important parameters of this component include:

■ Out-of-band rejection or attenuation levels, usually specified to meet these conditions:

❏ Far out-of-band signals - ranging from DC up to the first band of particular concern and from the last band of particular concern to beyond three times the highest passband frequency.

❏ Tx-band leakage - the transmitter channel power, although attenuated by the duplexer, still presents a cross-modulation threat in combination with Rx-band jammers. The RF filter must provide rejection of this Tx-band leakage.

❏ Other frequencies of particular concern . bands known to include other wireless transmitters that may deliver significant power levels to the receiver input.

| Parameter | | Frequency | Our Preliminary spec. D/N: T2140F3A | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| Passband | | | 2110 ... 2170 | | | MHz |
| Insertion loss | | 2110 ... 2170MHz | | 1.5 | 2.0 | dB |
| Ripple in passband | | 2110 ... 2170MHz | | 0.5 | 1.2 | dB |
| Amplitude imbalance | | 2110 ... 2170MHz | -1.5 | -1.11 +0.73 | +1.5 | dB |
| Phase imbalance | | 2110 ... 2170MHz | -10.0 | -1.92 +1.02 | +10.0 | deg. |
| Attenuation | Att1 | 0.1 ... 1980MHz | 40 | 43 | | dB |
| | Att2 | 1980 ... 2040MHz | 30 | 34 | | dB |
| | Att3 | 2250 ... 3000MHz | 18 | 25 | | dB |
| | Att4 | 3000 ... 6000MHz | 25 | 40 | | dB |
| VSWR | Input | 2110 ... 2170MHz | | 1.5 | 2.0 | |
| | Output | 2110 ... 2170MHz | | 1.5 | 2.0 | |
| Input impedance (Single Ended) | | | 50 | | | Ohm |
| Output impedance (Differential) | | | 100 // 10nH | | | Ohm |
| Maximum drive level | | 1920 ... 1980MHz | | | +10 | mW |
| DC Input level | | | | | +3 | V |
| Operating temperature | | | -25 | | +85 | deg. C |
| Storage temperature | | | -30 | | +85 | deg. C |

**Table 1.3 WCDMA Rx SAW Filter Specification**

## 3.5.8 Bluetooth (M100 : LBRQ-2B43A)

The MSM6280 includes BT baseband embedded BT 1.1 compliant baseband core, so the other bluetooth components are an bluetooth RF module and Antenna. Figure1.5.12-1 shows the bluetooth system architecture in the KU380.
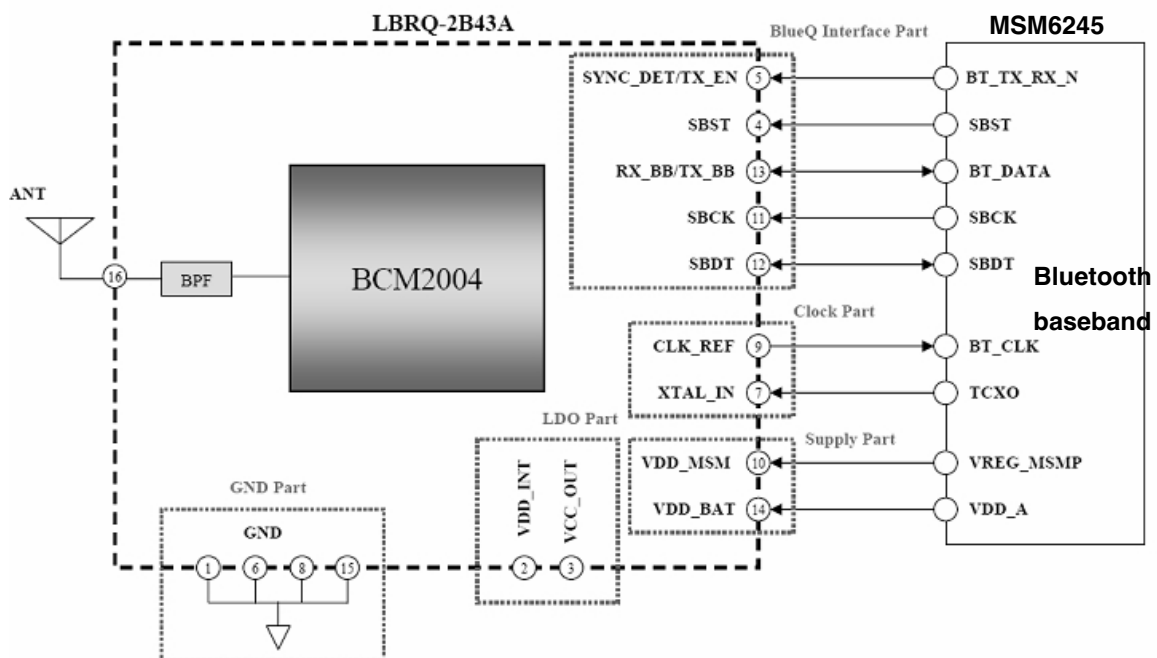


**[Figure1.9] Bluetooth system architecture**

# 3. BB Technical Description

## 3.6 Digital Baseband(DBB/MSM6245)

### 3.6.1 General Description

**A. Features(MSM6245)**

■ Support for multimode operation - tri-band WCDMA (UMTS), quad-band GSM/GPRS/EDGE

■ Support for WCDMA (UMTS) uplink data rate up to 384 kbps

■ High-performance ARM926EJ-S running at up to 225 MHz

■ ARM Jazelle Java hardware acceleration for faster Java-based games and other applets

■ QDSP4000 high-performance DSP cores

■ Integrated Bluetooth 1.2 baseband processor for wireless connectivity to peripherals

■ Qcamera¢, with 30 fps QCIF viewfinder resolution, and support for 2 MP camera sensors

■ Direct interface to digital camera module with video front end (VFE) image processing

■ True 3D graphics for advanced wireless gaming

■ SecureMSM v2.0 includes support for Open Mobile Alliance (OMA) DRM v2.0, SIM-lock and IMEI integrity. Support for Q-fuse. Only trusted boot is supported

■ Audio that is on par with portable music players

■ Vocoder support (AMR, FR, EFR, HR)

■ Advanced 14 x 14 mm, 0.5 mm pitch, 409-pin lead-free CSP packaging technology

■ SD/SDIO hardware support
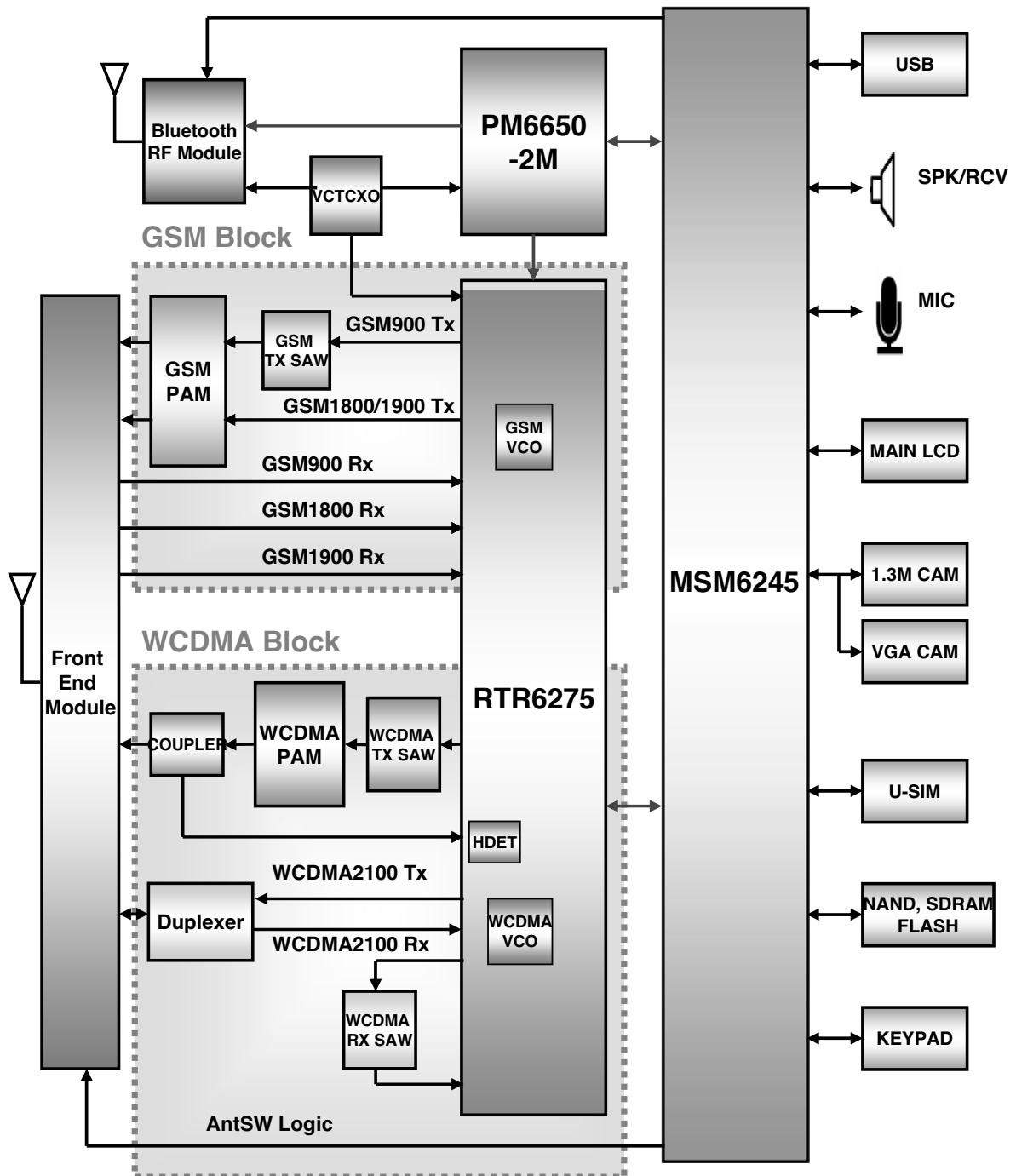
**Figure. Simplified Block Diagram**

## 3.6.2 Block Diagram(MSM6245)
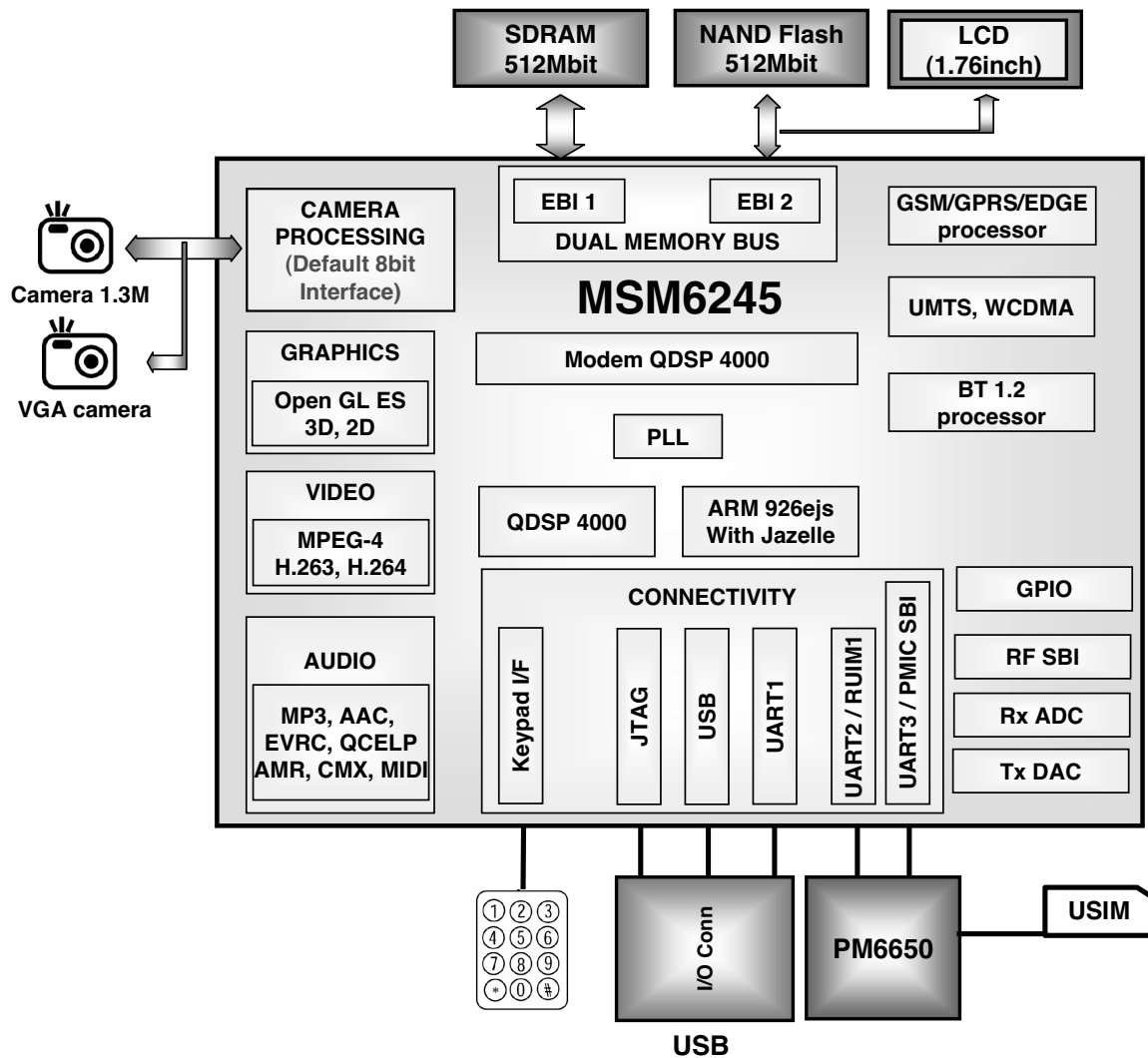


**Figure. Simplified Block Diagram of MSM6245**

## 3.7 Subsystem(MSM6245)

### 3.7.1. ARM Microprocessor Subsystem

The MSM6245 device uses an embedded ARM926EJ-S microprocessor. This microprocessor, through the system software, controls most of the functionality for the MSM, including control of the external peripherals such as the keypad, LCD, RAM, ROM, and EEPROM devices. Through a Generic single-wire serial bus interface (SSBI) the ARM926EJ-S configures and controls the functionality of the RTR6275, RFR6275 and PM6650 devices.

### 3.7.2 WCDMA R99 features

The MSM6245 device supports release 99 June 2004 of the W-CDMA FDD standard, including the following features:

■ All modes and data rates for W-CDMA frequency division duplex (FDD), with the following restrictions:

❏ The downlink supports the following specifications:
- Up to four physical channels, including the broadcast channel (BCH), if present
- Up to three dedicated physical channels (DPCHs)
- Spreading factor (SF) range support from 4 to 256
- The following transmit diversity modes are supported:
❏ Space time transmit diversity (STTD)
❏ Time-switched transmit diversity (TSTD)
❏ Closed-loop feedback transmit diversity (CLTD)

■ The uplink supports the following specifications:

❏ The uplink provides the following UE support:
- One physical channel, eight TrCH, and 16 TrBks starting at any frame boundary
- A maximum data rate of 384 kbps
❏ Full SF range support from 4 to 256

■ SMS (CS and PS)

■ PS data rate - 384 kbps DL / 384 kbps UL

■ CS data rate - 64 kbps DL / 64 kbps UL

■ AMR (all rates)

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## 3.7.3 GSM features

The following GSM modes and data rates are supported by the MSM6245 device hardware. Support modes conform to release '99 specifications of the sub-feature.

■ Voice features

- ❏ FR
- ❏ EFR
- ❏ AMR
- ❏ HR
- ❏ A5/1, A5/2, and A5/3 ciphering

■ Circuit-switched data features

- ❏ 9.6k
- ❏ 14.4k
- ❏ Fax
- ❏ Transparent and non-transparent modes for CS data and fax
- ❏ No sub-rates are supported.

## 3.7.4 GPRS features

■ Packet switched data (GPRS)
- ❏ DTM (Simple Class A) operation
- ❏ Multi-slot class 12 data services
- ❏ CS schemes: CS1, CS2, CS3, and CS4
- ❏ GEA1, GEA2, and GEA3 ciphering

■ Maximum of four Rx timeslots per frame

## 3.7.5 EDGE features

■ EDGE E2 power class for 8 PSK

■ DTM (simple Class A), multi-slot class 12

■ Downlink coding schemes - CS 1-4, MCS 1-9

■ Uplink coding schemes - CS 1-4, MCS 1-9

■ BEP reporting

■ SRB loopback and test mode B

■ 8-bit, 11-bit RACH

■ PBCCH support

■ 1 phase/2 phase access procedures

■ Link adaptation and IR

■ NACC, extended UL TBF.

### 3.7.6 MSM6245 device audio processing features

■ Integrated wideband stereo CODEC

❏ 16-bit DAC with typical 88 dB dynamic range
❏ Supports sampling rates up to 48 kHz on the speaker path and 16 kHz on the microphone path

■ VR- Voice mail + voice memo

■ Acoustic echo cancellation

■ Audio AGC

■ Audio Codecs: AMR-NB, AAC, AAC Plus, Enhanced AAC Plus, Windows Audio v9, Real Audio 8 (G2)

■ Internal vocoder supporting AMR, FR, EFR, and HR

### 3.7.7 MSM6245 microprocessor subsystem

■ Industry standard ARM926EJ-S embedded microprocessor subsystem

❏ 16 kB instruction and 16 kB data cache
❏ Instruction set compatible with ARM7TDMI®
❏ ARM version 5TEJ instructions
❏ Higher performance 5 stage pipeline, Harvard cached architecture
❏ Higher internal CPU clock rate with on-chip cache

■ Java hardware acceleration

■ Enhanced memory support

❏ 75 MHz and 90 MHz bus clock for SDRAM
❏ 32-bit SDRAM
❏ Dual memory buses separating the high-speed memory subsystem (EBI1) from low-speed peripherals (EBI2) such as LCD panels
❏ 1.8 memory interface support for EBI1 and 1.8 V or 2.6 V memory interface support EBI2
❏ NAND FLASH memory interface
  - 8/16-bit data I/O width NAND flash support
  - 1- or 4-bit ECC
  - 512-byte/2KB page-size support
  - 2 chip selects supported for NAND Flash
❏ Boot from NAND
❏ Low-power SDRAM (LP-SDRAM) interface

■ Internal watchdog and sleep timers

# 3. TECHNICAL BRIEF

## 3.7.8 Supported interface features

■ USB On-the-Go core supports both slave and host functionality

■ Three universal asynchronous receiver transmitter (UART) serial ports

■ USIM controller (via UART)

■ Integrated 4-bit secure digital (SD) controller for SD and Mini SD cards

■ Parallel LCD interface

■ General-purpose I/O pins

■ External keypad interface

## 3.7.9 Supported multimedia features

■ Provide additional general purpose MIPS by using:

❑ Two QDSP4000s
❑ Dedicated hardware accelerators and compression engines

■ Improve Java, BREW, and game performance

❑ Integrated Java and 2D/3D graphics accelerator with Sprite engine

■ Enable various accessories via USB host connectivity.

❑ Integrated USB host controller functionality

■ Enable compelling visual and audio applications.

**Qcamera™**

■ High-quality digital camera processing, supporting CCD or CMOS image sensors up to 2MP

■ 30 fps QCIF viewfinder

**Qtv™**

■ Audio and video decoder that supports VOD, MOD and Broadcast multimedia services.

■ Audio codecs supported: AMR-NB, AMR-WB, AMR-WB+, AAC, AAC Plus, Enhanced AAC Plus, Windows® Media Audio v9, RealAudio® v8

■ Integrated stereo wideband codec for music/digital clips

■ CMX

■ Video codecs supported: MPEG-4, H.263, H.264, Windows Media® v9 and RealNetworks® v10

**Video telephony services: Qvideophone™**

■ A two-way mobile video conferencing solution that delivers 15 fps @ QCIF, 64kbps

■ Video codecs supported: MPEG-4 and H.263

■ Audio codecs supported: AMR-NB.

**Qcamcorder™**

■ Real time mobile video encoder

■ Video codecs supported: MPEG-4, H.263.H.264

■ Audio codecs supported: AMR-NB

■ Recording performance: 15 fps @ QCIF, 192 kbps

**CMX™ (MIDI and still image, animation, text, LED/vibrate support)**

■ 72 simultaneous polyphonic tones

■ 44 kHz sampling rate

■ 512 kB wave table

■ Support of universal file formats
   ❏ Standard MIDI Format (SMF)
   ❏ SP-MIDI
   ❏ SMAF Audio playback (MA-2, MA-3, MA-5)
   ❏ XMF/OLS
   ❏ MFi (requires Docomo license)
■ PNG decoder

■ Pitch bend range support

■ LED/vibrate support

■ Scalable Vector Graphics (SVG- Tiny 1.1 + SVG Tiny 1.2)

■ MLZ decoder

■ Integrated PNG/SAF A.T.

# 3. TECHNICAL BRIEF

**Table 1-1  Summary of MSM6245 device features**

| Features | MSM6245 |
|---|---|
| Modem | Tri-band WCDMA<br>Quad-band GSM/GPRS/EDGE<br>WEDGE<br>DTM |
| Processor | ARM926 EJ-S – 225 MHz AHB – 75 MHz<br>ARM926 EJ-S – 122 MHz AHB – 61 MHz for limited MM<br>QDSP – 100 MHz |
| Process technology | 65 nm |
| Supported RF platforms (see Table 1-2 for platform definition) | Platform B (RTR6275 + RFR6275)<br>Platform E (RTR6275 + RFR6275)<br>Platform F (RTR6285) |
| HSDPA | Not supported |
| Enhanced antenna | SAIC |
| Memory configuration | 8/16-bit NAND and  32-bit SDRAM (See Note 1) |
| Broadcast interface | Not supported |
| Power management IC | PMIC 6650-2 |
| USB | 3-wire USB-OTG |
| MDDI | Supported |
| Boot mode | Trusted boot mode only |
| Qcamera (camera interface)<br>Viewfinder frame rate | Up to 2.0M pixel support<br>30 fps @ QCIF |
| Qcamcorder (recording performance) | 15 fps @ QCIF |
| Qtv  (video decode) | 15 fps QCIF streaming, 15 fps QCIF playback |
| Audio/video decoders | MP3, AAC, AAC+, ADPCM, MPEG4, H.263, H.264, Real networks, Windows media, WB-AMR/+ |
| Qvideophone (video telephony) | 15 fps @ QCIF |
| LCD HW Interface | 18 bpp |

Note:
1. At this time, only 32-bit SDRAM is supported on the MSM6245 device. There are potential MIPS issues when running Bluetooth and video telephony concurrently with any other memory configuration. 16-bit SDRAM and NOR FLASH are currently being evaluated and documentation will be updated accordingly in the next revision.

**Table 1-2  Description of RF configurations**

| Platform | Chipset | Mode/band | Band Class |
|---|---|---|---|
| Platform B | RTR6275 IC<br>RFR6275 IC | UMTS 850, 1900, 2100<br>GSM/GPRS/EDGE 850/900/1800/1900 | 5, 2, 1 |
| Platform E | RTR6275 IC<br>RFR6275 IC | UMTS 850, 1900, 2100<br>GSM/GPRS/EDGE 850/900/1800/1900<br>EU 900 UMTS<br>AWS 1.7UL:2.1 DL<br>JPN 1700 UMTS | 5, 2, 1<br><br>8<br>4<br>9 |
| Platform F | RTR6285 IC | US: UMTS 850, AWS, 1900<br>JP: UMTS 800, 1700, 2100<br>EU: UMTS 900, 2100<br>GSM/GPRS/EDGE 850/900/1800/1900 | 5, 4, 2<br>6, 9, 1<br>8, 1 |

### 3.7.10 Stereo Wideband CODEC

The MSM6245 device integrates a wideband voice/audio CODEC into the mobile station modem (MSM). The CODEC supports two differential microphone inputs, one differential earphone output, one single-ended earphone output, and a differential analog auxiliary interface.

The CODEC integrates the microphone and earphone amplifiers into the MSM6245 device, reducing the external component count to just a few passive components.

The microphone (Tx) audio path consists of a two-stage amplifier with the gain of the second stage set externally. The Rx/Tx paths are designed to meet the ITU-G.712 requirements for digital transmission systems.

### 3.7.11 Vocoder Subsystem

The MSM6245 device's QDSP4000 supports AMR,FR,EFR and HR. In addition, the QDSP4000 has modules to support DTMF tone generation, DTMF tone detection, Tx/Rx volume controls, Tx/Rx automatic gain control (AGC), Rx Automatic Volume Control (AVC), ear seal echo canceller (ESEC), Acoustic Echo Canceller (AEC), Noise Suppression (NS), and programmable, 13-tap, Type-I, FIR, Tx/Rx compensation filters. The MSM6245 device's integrated ARM9TDMI processor downloads the firmware into the QDSP4000 and configures QDSP4000 to support the desired functionality.

### 3.7.12 ARM Microprocessor subsystem

The MSM6245 device uses an embedded ARM926EJ-S microprocessor. This microprocessor, through the system software, controls most of the functionality for the MSM device, including control of the external peripherals such as the keypad, LCD, RAM, ROM, and EEPROM devices. Through a generic single serial bus interface (SSBI) the ARM926EJ-S configures and controls the functionality of the RFR6275, RTR6275, and PM6650 devices.

### 3.7.13 Mode Select and JTAG Interfaces

The mode pins to the MSM6245 device determine the overall operating mode of the ASIC. The options under the control of the mode inputs are Native mode, which is the normal subscriber unit operation, ETM mode, which enables the built-in trace mode, and test mode for factory testing.

The MSM6245 device meets the intent of the ANSI/IEEE 1149.1A-1993 feature list. The JTAG interface can be used to test digital interconnects between devices within the mobile station during manufacture.

# 3. TECHNICAL BRIEF

### 3.7.14 General-Purpose Input/Output Interface

The MSM62450 device has general-purpose bidirectional input/output pins. Some of the GPIO pins have alternate functions supported on them. The alternate functions include USB interface, additional RAM, ROM, general-purpose chip selects, parallel LCD interface, and a UART interface. The function of these pins is documented in the various software releases.

### 3.7.15 UART

The MSM6245 device employs three UARTs. UART1 has dedicated pins while UART2 and UART3 share multiplexed pins.

### 3.7.16 USB

The MSM6245 device integrates a universal serial bus (USB) controller that supports both unidirectional and bidirectional transceiver interfaces. The USB controller acts as a USB peripheral communicating with the USB host. MSM6245 supports the 3-wire functionality.

## 3.8 Power Block

### 3.8.1 General

MSM6245, included RF, is fully covered by PM6650(Qualcomm PMIC). PM6650 cover the power of MSM6245, MSM memory, RF block, Bluetooth, USIM and TCXO. Major power components are :

### 3.8.2 PM6650

The PM6650 device (Figure 1-1) integrates all wireless handset power management. The power management portion accepts power from all the most common sources - battery, external charger, adapter, coin cell back-up - and generates all the regulated voltages needed to power the appropriate handset electronics. It monitors and controls the power sources, detecting which sources are applied, verifying that they are within acceptable operational limits, and coordinates battery and coin cell recharging while maintaining the handset electronics supply voltages. Eight programmable output voltages are generated using low dropout voltage regulators, all derived from a common trimmed voltage reference.

A dedicated controller manages the TCXO warm-up and signal buffering, and key parameters (under-voltage lockout and crystal oscillator signal presence) are monitored to protect against detrimental conditions.

MSM device controls and statuses the PM6650 IC using Single Serial Bus Interface (SSBI) supplemented by an Interrupt Manager for time-critical information. Another dedicated IC Interface circuit monitors multiple trigger events and controls the power-on sequence.
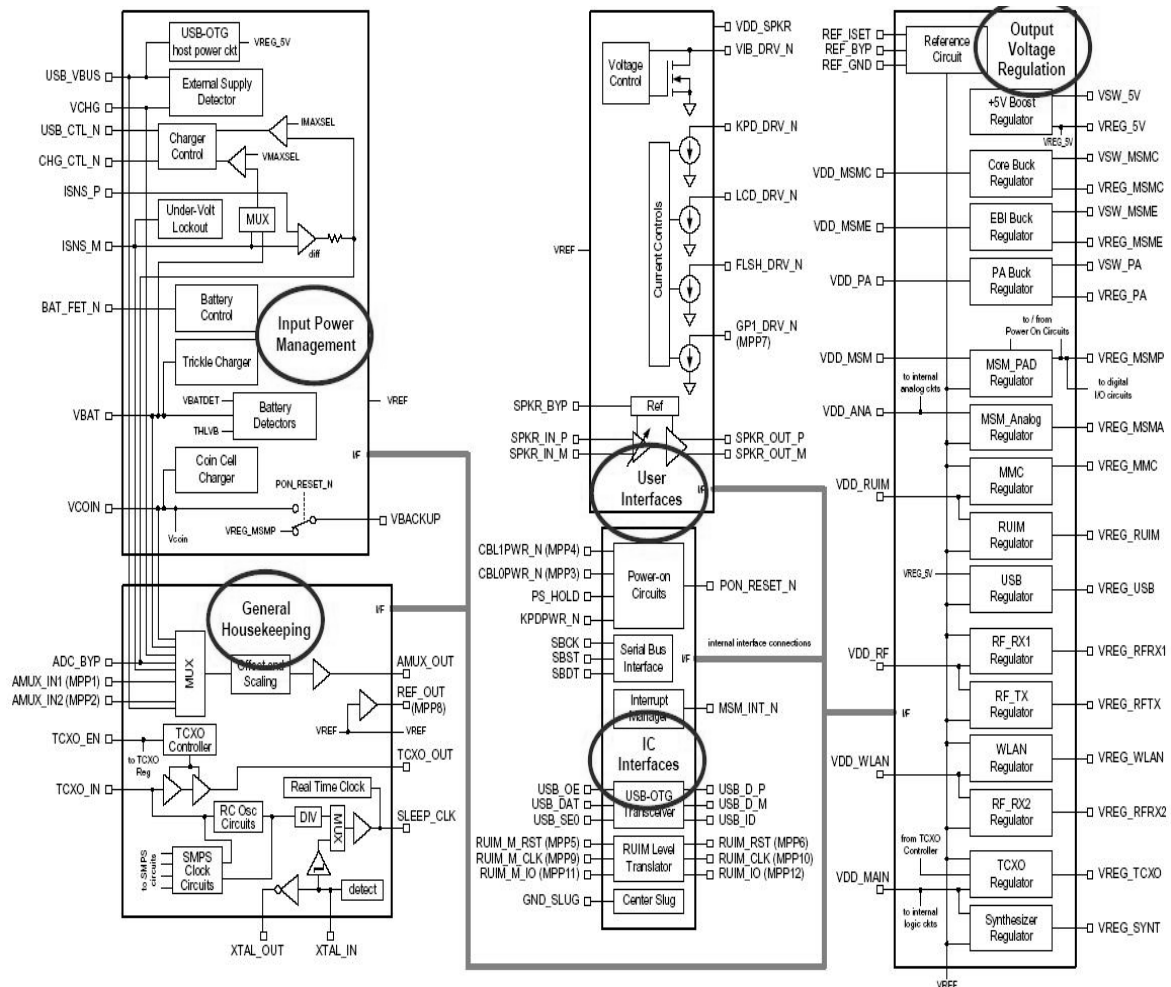
**Figure 1-1. PM6650 Functional Block Diagram**

## 3.8.3 Charging control

A programmable charging block in PM6650 is used for battery charging. It is possible to set limits for the charging current. The external supply typically connects directly to pin (VCHG). The voltage on this pin (VCHG) is monitored by detection circuitry to ascertain whether a valid external supply is applied or not. For additional accuracy or to capture variations over time, this voltage is routed internally to the housekeeping ADC via the analog multiplexer. PM6650 circuits monitor voltages at VCHARGER and ICHARGE pins to determine which supply should be used and when to switch between the two supplies. These pins are connected to the Source (or emitter) and Drain (or collector) contacts of the pass transistor respectively.
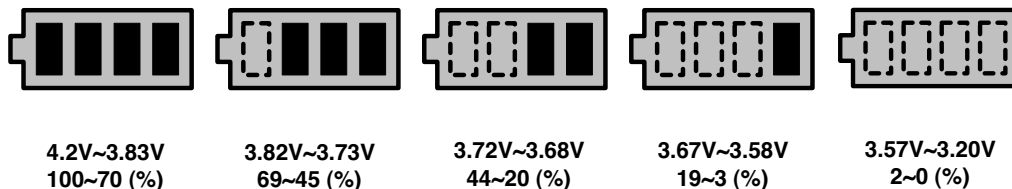


**KU380 Battery Bar Display(Stand By Condition)**

# 3. TECHNICAL BRIEF

## Trickle Charging

Trickle Charging of the main battery, enabled through SBI control and powered from $V_{DD}$, is provided by the PM6650 IC, The trickle charger is on-chip programmable current source that supplies current from $V_{DD}$ to pin (VBAT). Trickle charging can be used for lithium-ion and nickelbased batteries, with its performance specified below (3.2V). The charging current is set to 80mA.

| Parameter | Min | Typ | Max | Unit |
|-----------|-----|-----|-----|------|
| Trickle Current | 60 | 80 | 100 | mA |



1) Pass transistor (not shown) is turned ON

2) Battery transistor is turned OFF

3) On-chip programmable current source runs off VDD

4) Current is set by software: 0 (off) to 80 mA; 8 states

5) Charging current (blue) flows out pin 6 (VBAT)

6) Battery voltage is routed to MSM ; MSM HKADC measures VBAT

7) Trickle charging is finished when the battery reaches the desired threshold

"Auto Trickle Charge" feature

When this feature is enabled VBAT is checked as soon as a valid external supply is detected.

- If VBAT < 1V: Faulty battery, too low to chg; PM6650 powers up normally

- If 1V < VBAT < 3V: Battery good but depleted; trickle charging auto-started. Special algorithm followed.

- If VBAT > 3V: Normal PM6650 power-up

## Constant Current Charging

The PM6650 IC supports constant current charging of the main battery by controlling the charger pass transistor and the battery transistor. The constant current charging continues until the battery reaches its target voltage, 4.2V.

## Constant Voltage Charging

Constant voltage charging begins when the battery voltage reaches a target voltage, 4.2V.
The end of constant voltage charging is commonly detected 10% of the full charging current.
· Charging Method : CC & CV (Constant Current & Constant Voltage)
· Maximum Charging Voltage : 4.2V
· Maximum Charging Current : 600mA
· Nominal Battery Capacity : 900mAh
· Charger Voltage : 5.1V
· Charging time : Max 3.5h (Except time trickle charging)
· Full charge indication current (icon stop current) : 100mA
· Low battery POP UP : Idle - 3.58V, Dedicated(GSM/WCDMA) - 3.58V
· Low battery alarm interval : Idle - 3 min, Dedicated - 1min
· Cut-off voltage : 3.20V

## 3.9 External memory interface

The MSM6245 device was designed to provide two distinct memory interfaces. EBI1 was targeted for supporting high speed synchronous memory devices. EBI2 was targeted towards supporting slower asynchronous devices such as LCD, NAND flash, SDRAM, etc.

·EBI1 Features

- 16 bit static and dynamic memory interface
- 32 bit dynamic memory interface
- 24 bits of address for static memory devices which can support up to 32MBytes on each chip select
- Synchronous burst memories supported (burst NOR, burst PSRAM)
- Synchronous DRAM memories supported
- Byte addressable memory supporting 8 bit, 16 bit and 32 bit accesses
- Pseudo SRAM (PSRAM) memory support

·EBI2 Features

- Support for asynchronous FLASH and SRAM(16bit & 8bit).
- Interface support for byte addressable 16bit devices (UB_N & LB_N signals).
- Support for 8 bit/16bit wide NAND flash.
- Support for parallel LCD interfaces, port mapped of memory mapped(18 or 16 bit).

·2Gb NAND(16bit, Large Block ) flash memory + 1Gb SDRAM (32bit)

·1Gb NAND(8bit) flash memory + 512Mb SDRAM (32bit)

| Interface Spec | | | | |
|---|---|---|---|---|
| Device | Part Name | Maker | Read Access Time | Write Access Time |
| FLASH | TY9000A800JOGG | TOSHIBA | 50 ns | 30 ns |
| SDRAM | TY9000A800JOGG | TOSHIBA | 8 ns | 8 ns |

**Table#1. External memory interface**

EBI1

EBI2

ADDRESS[12:0]

DATA[31:0]

WE*

CS*

CAS*

RAS*

CLK_EN

CLK

DQM[3:0]

SDRAM

512Mb

MSM6245

NAND_CS*

NAND_RE*

NAND_WE*

NAND_CLE

NAND_WP*

NAND_ALE

NAND_READY

DATA[15:0]

NAND

1Gb

(126MB)
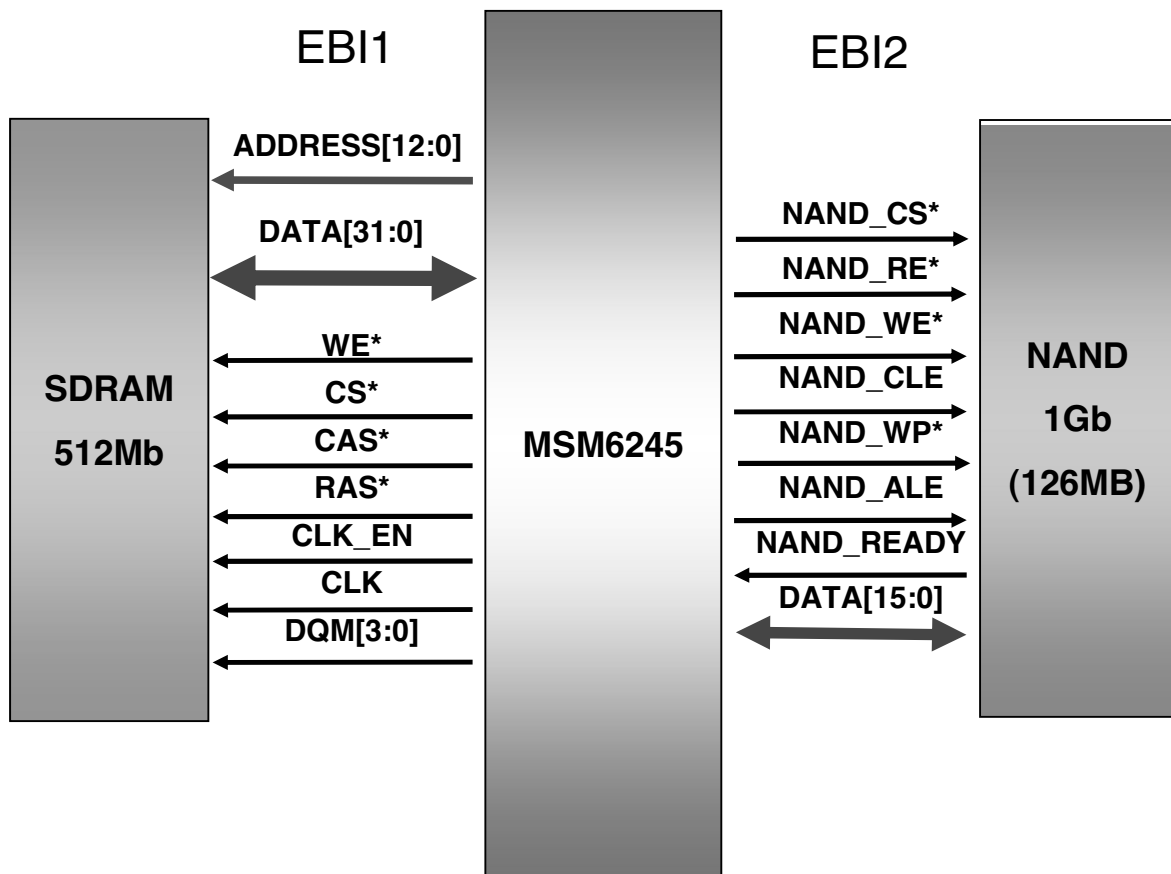
**Figure. Simplified Block Diagram of Memory Interface**

# 3.10 H/W Sub System

## 3.10.1 RF Interface

### A. RTR6275(WCDMA_Tx, GSM_Tx/Rx)

MSM6245 controls RF part(RTR6275) using these signals.

· SBST : SSBI I/F signals for control Sub-chipset

· PA_ON1 : Power AMP on RF part

· RX0_I/Q_M/P,TX_I/Q_M/P : I/Q for T/Rx of RF

· TX_AGC_ADJ : control the gain of the Tx signal prior to the power amplifier

· DAC_REF : Reference input to the MSM Tx data DACs

| Signal | Pin | | Net |
|---|---|---|---|
| XMEM1_CS_N3_SDRAM1_CS_N1_GPIO77 | Y6 | | |
| UART3_RFR_N_GPIO87 | L25 | | KEY_BL_EN |
| UART2_DP_RX_DATA_GPIO89 | H6 | | RCV_EN_N |
| SYNTH0_GP_PDM0_GPIO92 | F18 | | SLIDE_DETECT |
| SBST1_GPIO93 | H18 | | LCD_IF_MODE_1 |
| TX_AGC_ADJ | H13 | | TX_AGC_ADJ |
| TRK_LO_ADJ | L13 | | TRK_LO_ADJ |
| TCXO_EN_GPIO94 | F19 | | TCXO_EN |
| PA_ON0 | F17 | | PA_ON |
| Q_OUT_N | A12 | | TX_QM |
| Q_OUT | B12 | | TX_QP |
| I_OUT_N | A13 | | TX_IM |
| I_OUT | B13 | | TX_IP |
| DAC_REF | F12 | | DAC_REF |
| Q_IM_CH1 | W23 | | |
| Q_IP_CH1 | V23 | | |
| I_IM_CH1 | V25 | | |
| I_IP_CH1 | W25 | | |
| Q_IM_CH0 | AA25 | | RX_QM |
| Q_IP_CH0 | Y25 | | RX_QP |
| I_IM_CH0 | AB25 | | RX_IM |
| I_IP_CH0 | AC25 | | RX_IP |
| GP_PDM2_PA_RAN_GE1 | D17 | | |
| GP_PDM1_PA_RAN_GE0 | H17 | | PA_R0 |
| TRST_N | H15 | | JTAG_TRST_N |
| TCK | D16 | | JTAG_TCK |
| TMS | F15 | | JTAG_TMS |
| TDI | D15 | | JTAG_TDI |
| TDO | A17 | | JTAG_TDO |
| RTCK | H16 | | JTAG_RTCK |
| AUX_PCM_CLK_GRFC14_GPIO80 | K19 | | SPK_AMP_EN |
| AUX_PCM_DIN_GRFC13_GPIO14 | N21 | | |
| AUX_PCM_DOUT_GRFC12_GPIO103 | G4 | | |
| AUX_PCM_SYNC_GRFC11_GPIO102 | J8 | | |
| TX_ON_GRFC10 | H12 | | TX_ON |
| GRFC8_GPIO11 | B4 | | |
| GRFC7_GPIO10 | T23 | | ANT_SEL1 |
| GRFX6_GPIO9 | T19 | | ANT_SEL0 |
| GRFC5_AUX_SBST_GPIO8 | D11 | | |
| GRFC4_AUX_SBCK_GPIO7 | H10 | | |
| GRFC3_GPIO6 | F10 | | |
| GRFC2_GPIO5 | D9 | | GSM_PA_BAND |
| GRFC1_AUX_SBDT_GPIO4 | A8 | | GSM_PA_EN |
| GRFC0_GPIO3 | B8 | | |
| BT_CLK_GPIO25 | G23 | | BT_CLK |
| BT_SBST_GPIO24 | F23 | | BT_SBST |
| BT_SBCK_GPIO23 | E26 | | BT_SBCK |
| BT_SBDT_GPIO22 | E25 | | BT_SBDT |
| BT_TX_RX_N_GPIO21 | H21 | | BT_TX_RX_N |
| BT_DATA_GPIO20 | R19 | | BT_DATA |

GPIOs

Close to MSM

R211 0
R212 2K
C247 NA
C248 33nF

RF

JTAG

**Figure. Schematic of RF Interface of MSM6245**

## B. the others

・TRK_LO_ADJ : TCXO(19.2M) Control

・PA_ON : WCDMA(2100) TX Power Amp Enable

・ANT_SEL[0-2] : Ant Switch Module Mode Selection(WCDMA,GSM Tx/Rx,DCS-PCS Tx/Rx)

・GSM_PA_BAND : GSM/DCS-PCS Band Selection of Power Amp

・GSM_PA_RAMP : Power Amp Gain Control of APC_IC

・GSM_PA_EN : Power Amp Gain Control Enable of APC_IC

## 3.10.2 MSM Sub System

### 3.10.2.1. USIM Interface

SIM interface scheme is shown in Figure.
And, there control signals are followed

· USIM_CLK : USIM Clock

· USIM_Reset : USIM Reset

· USIM_Data : USIM Data T/Rx
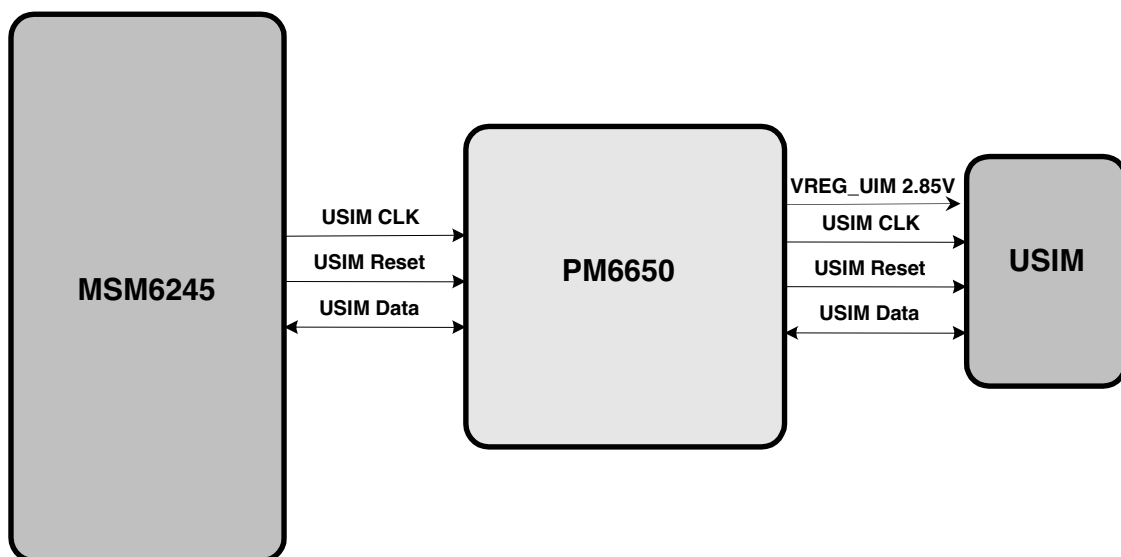


**Figure. SIM Interface**

### 3.10.2.2 UART Interface

UART signals are connected to MSM GPIO through IO connector with 115200 bps speed.

| GPIO_Map | Name | Note |
|----------|----------|---------|
| GPIO_96 | UART_RXD | Data_Rx |
| GPIO_95 | UART_TXD | Data_Tx |

**Table. UART Interface**

### 3.10.2.3 USB

The MSM6245 device contains a Universal Serial Bus (USB) interface to provide an efficient interconnect between the mobile phone and a personal computer (PC). The USB interface of the MSM6245 was designed to comply with the definition of a peripheral as specified in USB Specification, Revision 1.1. Therefore, by definition, the USB interface is also compliant as a peripheral with the USB Specification, Revision 2.0.

The USB Specification Revision 1.1 defines two speeds of operation, namely low-speed (1.5 Mbps) and full-speed (12 Mbps), both of which are supported by the MSM6245.

| Name | Note |
|------|------|
| USB_DAT | Data to/from MSM |
| USB_SE0 | Data to/from MSM |
| USB_OE_N | Out-Put Enable of Transceiver |
| USB_VBUS | USB_Power From Host(PC) |
| USB_D+ | USB Data+ to Host |
| USB_D- | USB Data- to Host |

**Table. USB Signal Interface**
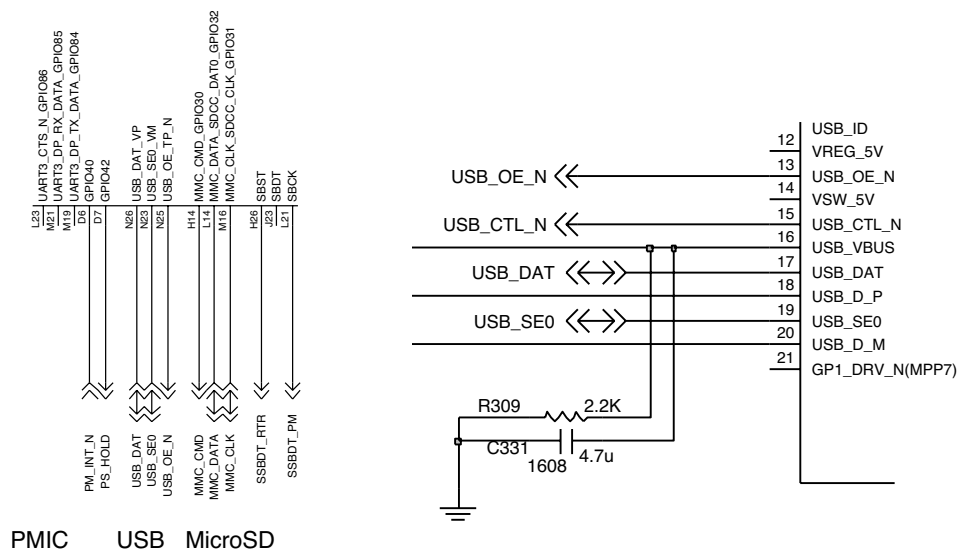


**Figure. Schematic of USB block(MSM6245 Side & PM6650 Side)**

# 3. TECHNICAL BRIEF

## 3.10.3 HKADC(House Keeping ADC)

The MSM6245 device has an on-chip 8-bit analog-to-digital converter (HKADC) which is tended to digitize DC signals corresponding to analog parameters such as battery voltage, temperature, and RF power levels. The MSM6245 device has six analog input pins which are multiplexed to the input of the internal HKADC.
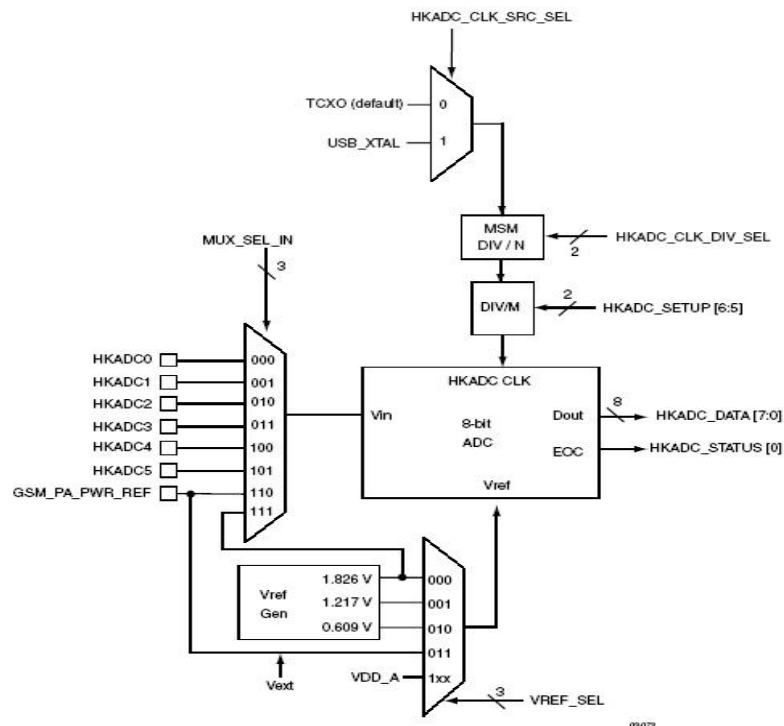


**Figure. MSM6245 HKADC Block diagram**

| Channel | Signal | Note |
|---------|--------|------|
| HKADC0 | AMUX_OUT | RF PAM Temperature Check |
| HKADC1 | VBATT_SENSE | Battery voltage level |
| HKADC2 | REF_ADC | ADC Reference voltage |
| HKADC3 | TTY_ADC_DET | Ear jack Detection for TTY |
| HKADC4 | PCB_Rev_ADC | PCB Version Check |
| HKADC5 | Battery_THERM | Battery Temperature Check |

**Table. HKADC channel table**

## 3.10.4 Key Pad

There are 23 main key buttons in Figure.
Shows the Keypad circuit. 'END' Key is connected to PMIC(PM6650).

|  | COL(0) | COL(1) | COL(2) | COL(3) | COL(4) |
|---|---|---|---|---|---|
| **ROW(0)** | - | - | - | CLR | MENU |
| **ROW(1)** | 1 | 2 | 3 | LEFT | UP |
| **ROW(2)** | 4 | 5 | 6 | OK | RIGHT |
| **ROW(3)** | 7 | 8 | 9 | SND | SEARCH |
| **ROW(4)** | * | 0 | # | DN | BACK |

**Table. Key Matrix Mapping Table**
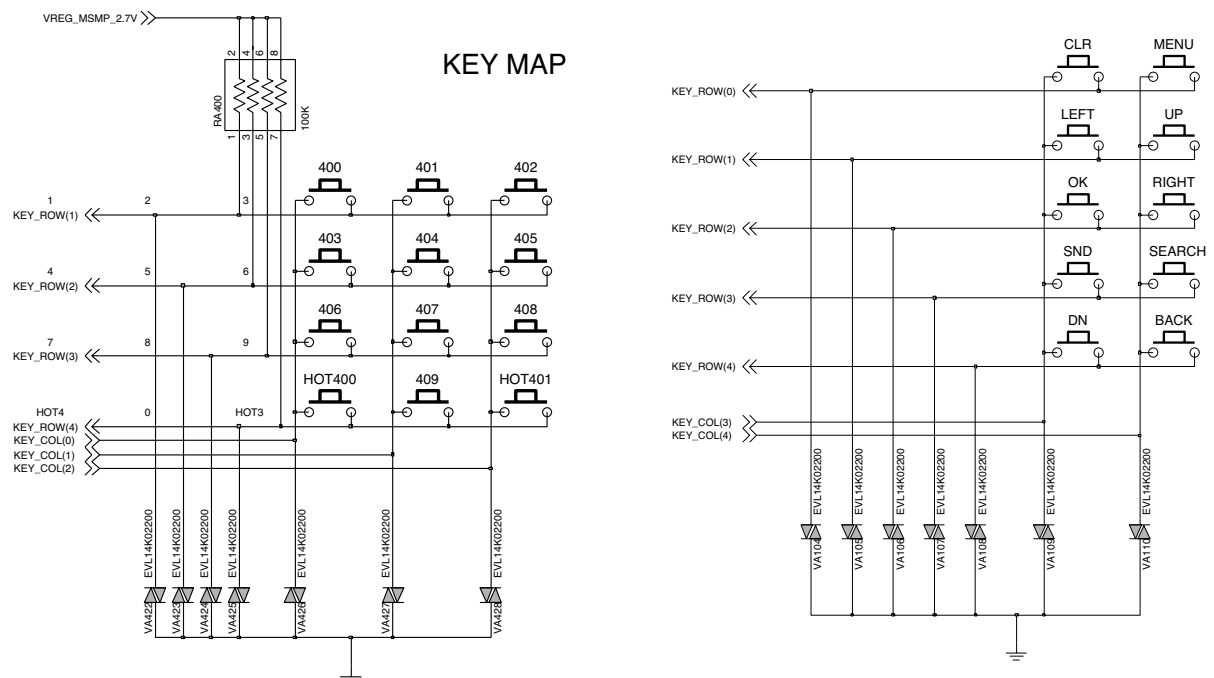


**Figure. Main/Sub Keypad Circuit**

# 3. TECHNICAL BRIEF
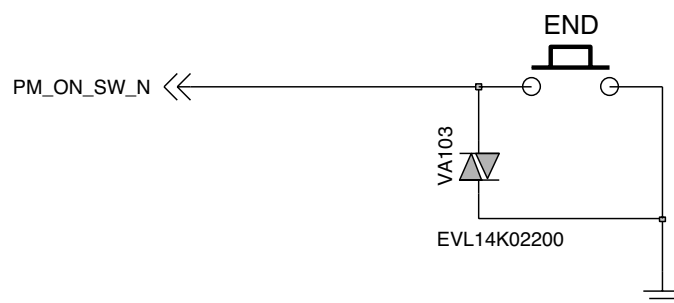


**Figure. END Keypad Circuit**

## 3.10.5 Camera Interface

KU380 Installed a 1.3M Pixel and 0.3Mega Camera.
Below figure shows the camera socket type connector and camera I/F signal.
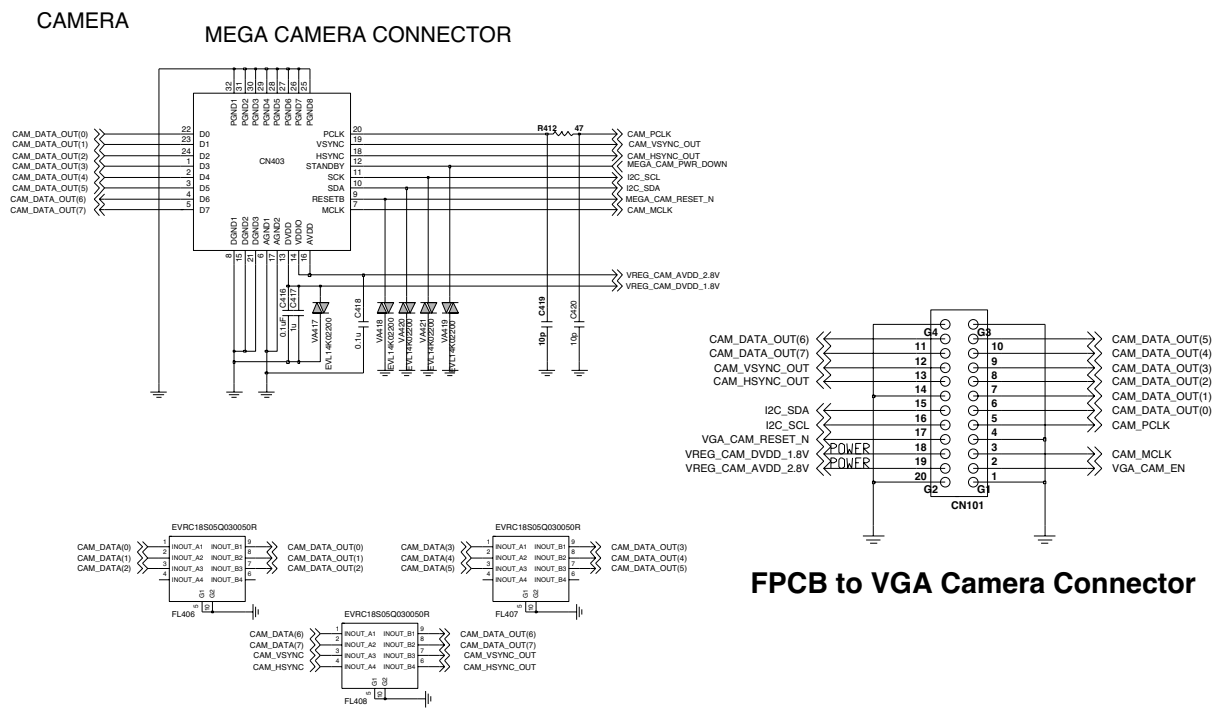


**Figure. Camera Socket Type Connector**

# 3. TECHNICAL BRIEF

The MEGA Camera module is connected to socket type connector with 24 pin (F95M08). Its interface is dedicated camera interface port in MSM6245. The camera port supply 24.576MHz master clock to camera module and receive 49.152MHz pixel clock (15fps), vertical sync signal, horizontal sync signal, reset signal and 8bits data from camera module. The camera module is controlled by I2C port from MSM6245.

| No | Name | Port | Note |
|----|------|------|------|
| 1 | CAM_DATA_OUT(3) | O | Data |
| 2 | CAM_DATA_OUT(4) | O | Data |
| 3 | CAM_DATA_OUT(5) | O | Data |
| 4 | CAM_DATA_OUT(6) | O | Data |
| 5 | CAM_DATA_OUT(7) | O | Data |
| 6 | GND | GND | GND |
| 7 | MCLK | I | Master Clock(24.576M) |
| 8 | GND | GND | GND |
| 9 | MEGA_CAM_RESET_N | I | Camera reset signal |
| 10 | I2C_SDA | O | I2C Data |
| 11 | I2C_SCL | O | I2C Clock |
| 12 | MEGA_CAM_PWR_DN | I | Camera power down |
| 13 | VREG_CAM_DVDD_1.8V | I | DVDD |
| 14 | VREG_CAM_AVDD_2.8V | I | VDDIO |
| 15 | GND | GND | GND |
| 16 | VREG_CAM_AVDD_2.8V | I | AVDD |
| 17 | GND | GND | GND |
| 18 | CAM_HSYNC_OUT | O | Horizontal Sync |
| 19 | CAM_VSYNC_OUT | O | Vertical Sync |
| 20 | CAM_PCLK | O | Pixel Clock (49.152M) |
| 21 | GND | GND | GND |
| 22 | CAM_DATA_OUT(0) | O | Data |
| 23 | CAM_DATA_OUT(1) | O | Data |
| 24 | CAM_DATA_OUT(2) | O | Data |

**Table. Interface between MEGA Camera Module and MAIN PCB (in camera module)**

The VGA Camera module is connected to socket type connector with 20 pin (CLE9120-2761E). Its interface is dedicated camera interface port in MSM6245. The camera port supply 24.576MHz master clock to camera module and receive 12.288MHz pixel clock (15fps), vertical sync signal, horizontal sync signal, reset signal and 8bits data from camera module. The camera module is controlled by I2C port from MSM6245.

| No | Name | Port | Note |
|----|------|------|------|
| 1 | VGA_CAM_EN | I | DVDD |
| 2 | CAM_MCLK | I | Master Clock(24.576M) |
| 3 | GND | GND | GND |
| 4 | VGA_CAM_PCLK | O | Clock for Camera Data Out(12M) |
| 5 | CAM_DATA(0) | O | Data |
| 6 | CAM_DATA(1) | O | Data |
| 7 | CAM_DATA(2) | O | Data |
| 8 | CAM_DATA(3) | O | Data |
| 9 | CAM_DATA(4) | O | Data |
| 10 | CAM_DATA(5) | O | Data |
| 11 | CAM_DATA(6) | O | Data |
| 12 | CAM_DATA(7) | O | Data |
| 13 | CAM_VSYNC_OUT | O | Vertical Sync |
| 14 | CAM_HSYNC_OUT | O | Horizontal Sync |
| 15 | GND | GND | GND |
| 16 | I2C_SDA | I | I2C Data |
| 17 | I2C_SCL | I | I2C Clock |
| 18 | VGA_CAM_RESET_N | I | Camera reset signal |
| 19 | VREG_CAM_DVDD_1.8V | I | Camera I/O Power |
| 20 | VREG_AVDD_2.8V | I | Camera I/O Power |

**Table. Interface between VGA Camera Module and MAIN PCB (in camera module)**

## 3.10.6 Keypad Light

There are 1 white LED in Main key backlight circuit, which are driven by KYDB_BACKLIGHT line from PM6650.
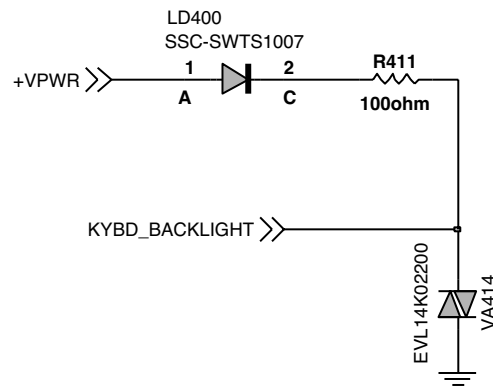


**Figure. Schematic of KEY back light circuit ( KEY side )**

## 3.10.7 LCD Module (IM176CBA2N)

- The IM176CBA2N model is a Color TFT Main supplied by LGIT. This LCD Module has a 1.76 inch diagonally measured active display area with 176(RGB)X220 resolution. each pixel is divided into Red, Green and Blue sub-pixels and dots which are arranged in vertical stripes.

* Features

- Display mode(Main LCD) : Normally White, Transmissive TN mode 265K colors.

- LCD Driver IC: HX8340 (Himax).

- 16 bit CPU interface Parallel

## 3.10.8 Display & LCD FPC Interface

LCD module is connected to LCD KEY FPCB with 35 pin (XF2B-3545-31A / OMROM) The LCD module is controlled by 16-bit EBI2 in MSM6245.

CN101

| Pin | Signal |
|-----|--------|
| 35 | LCD_RESET_N |
| 34 | LCD_IF_MODE_0 |
| 33 | LCD_IF_MODE_1 |
| 32 | LCD_VSYNC |
| 31 | LCD_CS_N |
| 30 | LCD_ADS |
| 29 | EBI2_WE_N |
| 28 | EBI2_OE_N |
| 27 | |
| 26 | EBI2_DATA(0) |
| 25 | EBI2_DATA(1) |
| 24 | EBI2_DATA(2) |
| 23 | EBI2_DATA(3) |
| 22 | EBI2_DATA(4) |
| 21 | EBI2_DATA(5) |
| 20 | EBI2_DATA(6) |
| 19 | EBI2_DATA(7) |
| 18 | EBI2_DATA(8) |
| 17 | EBI2_DATA(9) |
| 16 | EBI2_DATA(10) |
| 15 | EBI2_DATA(11) |
| 14 | EBI2_DATA(12) |
| 13 | EBI2_DATA(13) |
| 12 | EBI2_DATA(14) |
| 11 | EBI2_DATA(15) |
| 10 | |
| 9 | LCD_MAKER_ID |
| 8 | |
| 7 | VREG_LCD_2.8V |
| 6 | WLED_1 |
| 5 | WLED_2 |
| 4 | WLED_3 |
| 3 | WLED_PWR |
| 2 | |
| 1 | |

C106 0.1u
D101
PLW0501H-LF
INSTPAR

LCD CONNECTOR

**Figure. Interface between LCD Module and MAIN PCB.**

# 3. TECHNICAL BRIEF

### 3.10.8.1 Audio Signal Processing & Interface

Audio signal processing is divided uplink path and downlink path.

The uplink path amplifies the audio signal from MIC and converts this analog signal to digital signal and then transmits it to DBB Chip (MSM6245).

This transmitted signal is reformed to fit in GSM & WCDMA frame format and delivered to RF Chipset. The downlink path amplifies the signal from DBB chip (MSM6245) and outputs it to receiver (or speaker). The receive path can be directed to either one of two earphone amplifiers or the auxiliary output. The outputs earphone1 (EAR1OP, EAR1ON) and auxiliary out (LINE_P, LINE_N) are differential outputs. Earphone2 (HPH_L, HPH_R) is a single-ended output stage designed to drive a headset speaker. The microphone interface consists of two differential microphone inputs, one differential auxiliary input and a two-stage audio amplifier.
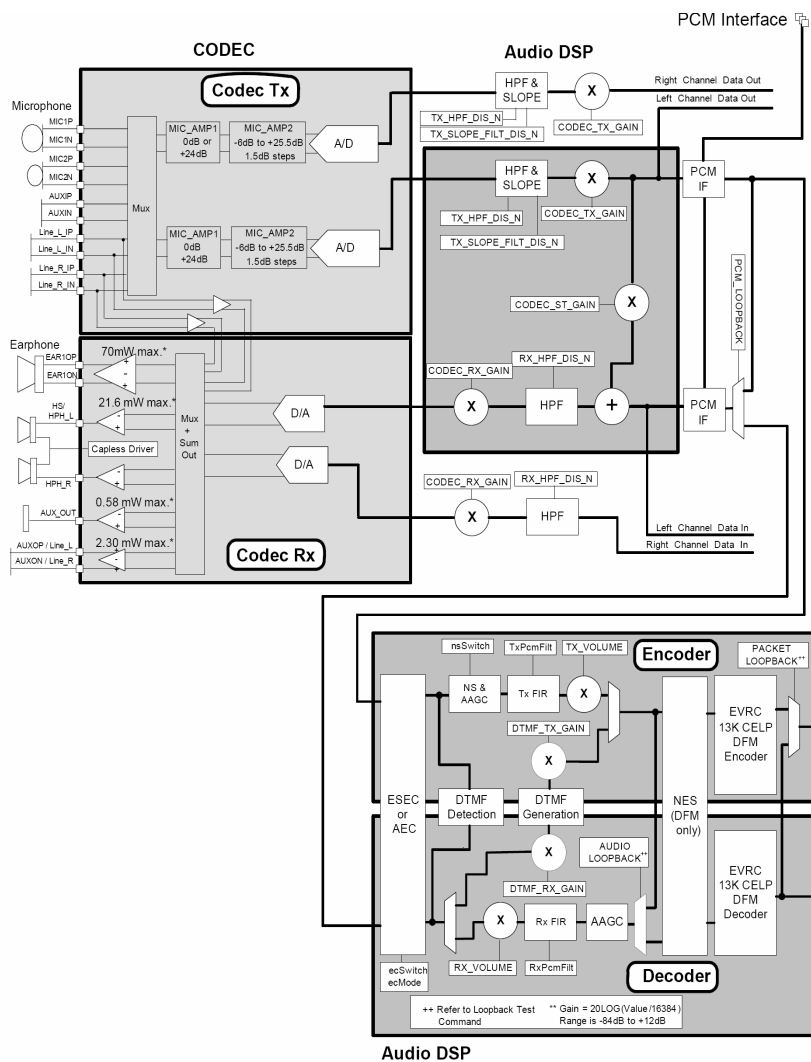


**Figure. Audio Interface Detailed Diagram(MSM6245)**

**MSM6245 CODEC pins**
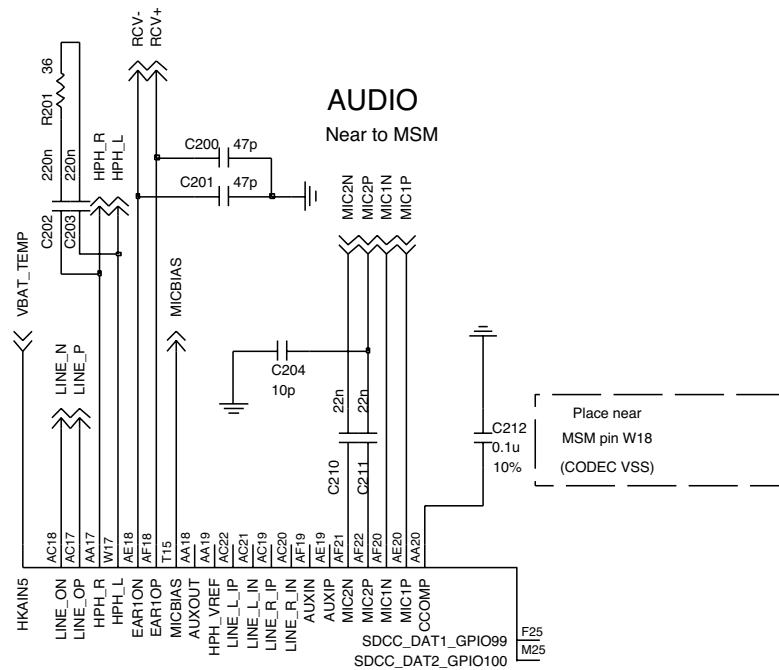


**Figure . Audio part schematics**
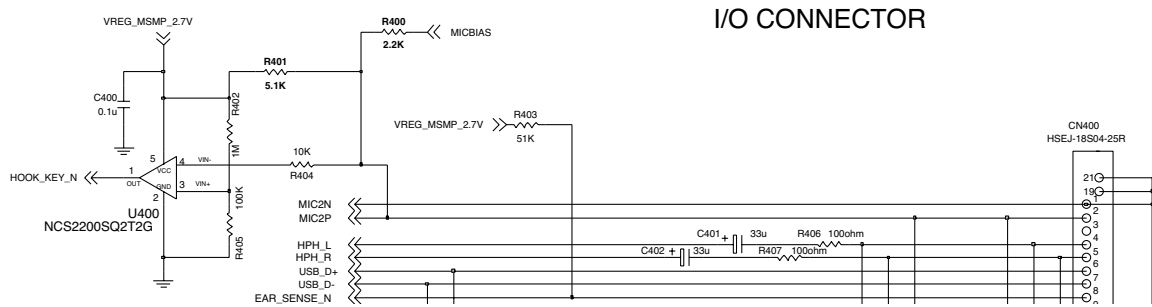


**Figure . Audio part schematics**

AUDIO

SELECT_SPK&RCV
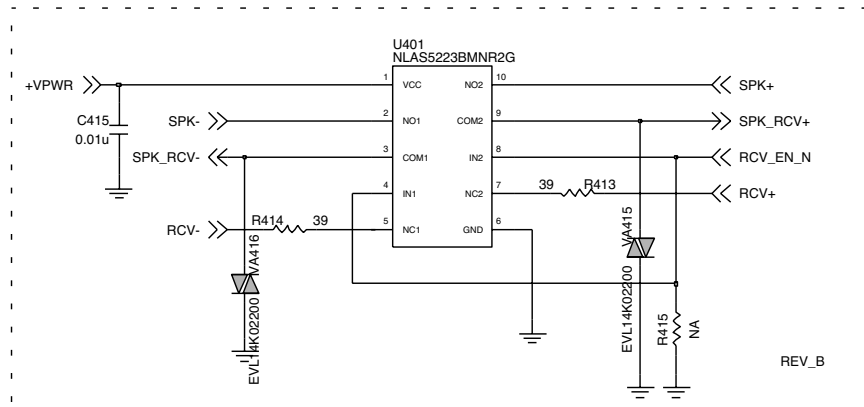


MIC
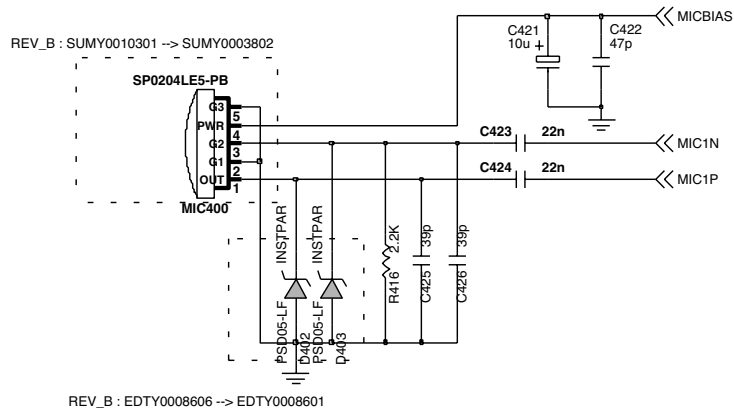


Audio AMP
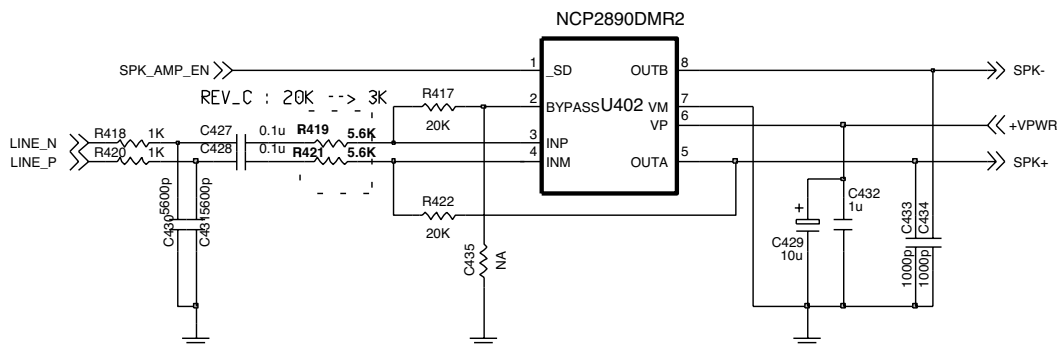


**Figure . Audio part schematics**

### 3.10.8.2 Audio Mode

There are three audio modes (Voice call, speaker phone, MIDI/MP3).

| MODE | Device | Description |
|---|---|---|
| **Voice Call** | Receiver Mode | Receiver Voice Call |
| | Loud Mode | Speaker Phone |
| | Headset | Headset Voice Call |
| **Speaker phone** | Loud Mode | Speaker Phone |
| **MIDI** | Loud Mode | Speaker MIDI Bell |
| | Headset | Headset MIDI Bell |
| **MP3** | Loud Mode | Speaker MP3 |
| | Headset | Headset MP3 |

**Table. Audio Mode**

**Audio & Sound Main Component**

There are 6 main components in KU380.

| | Component | Design No. | Maker Part No. | Note |
|---|---|---|---|---|
| 1 | MSM6245 | U201 | MSM6245 | Base-Band Modem |
| 2 | Audio amp | U402 | NCP2890DMR2 | 1W Audio Amp |
| 3 | Analog Switch | U401 | NLAS5223BMNR2G | Dual Analog Switch |
| 4 | Speaker/Receiver | | EMS1810TFR1P | Speaker/Receiver |
| 5 | MIC | MIC400 | SP0204LE5-PB | SMD microphone |
| 6 | Ear jack | | RMBLGG080STSB | Ear jack |

**Table. Audio main component list**

## 3.11 Main Features

### 1. LG-KU380 Main features

- Slide Type

- WCDMA(2100) + GSM Tri-Band (900/1800/1900)/EDGE

- Color LCD (Main:262K TFT, 1.76")

- Dual Camera (1.3Mega + VGA(0.3M))

- 1810 speaker/receiver

- Stereo Headset

- Speaker phone (in GSM and WCDMA)

- MP3/AAC decoder and play

- MPEG4 encoder/decoder and play/save

- JPEG en/decoder

- Supports Bluetooth, USB

- 900 mAh (Li-Ion)

## 2. KU380 Main Component



RF

Power

Logic

Bluetooth

Main board (Top)     Main board (Bottom)
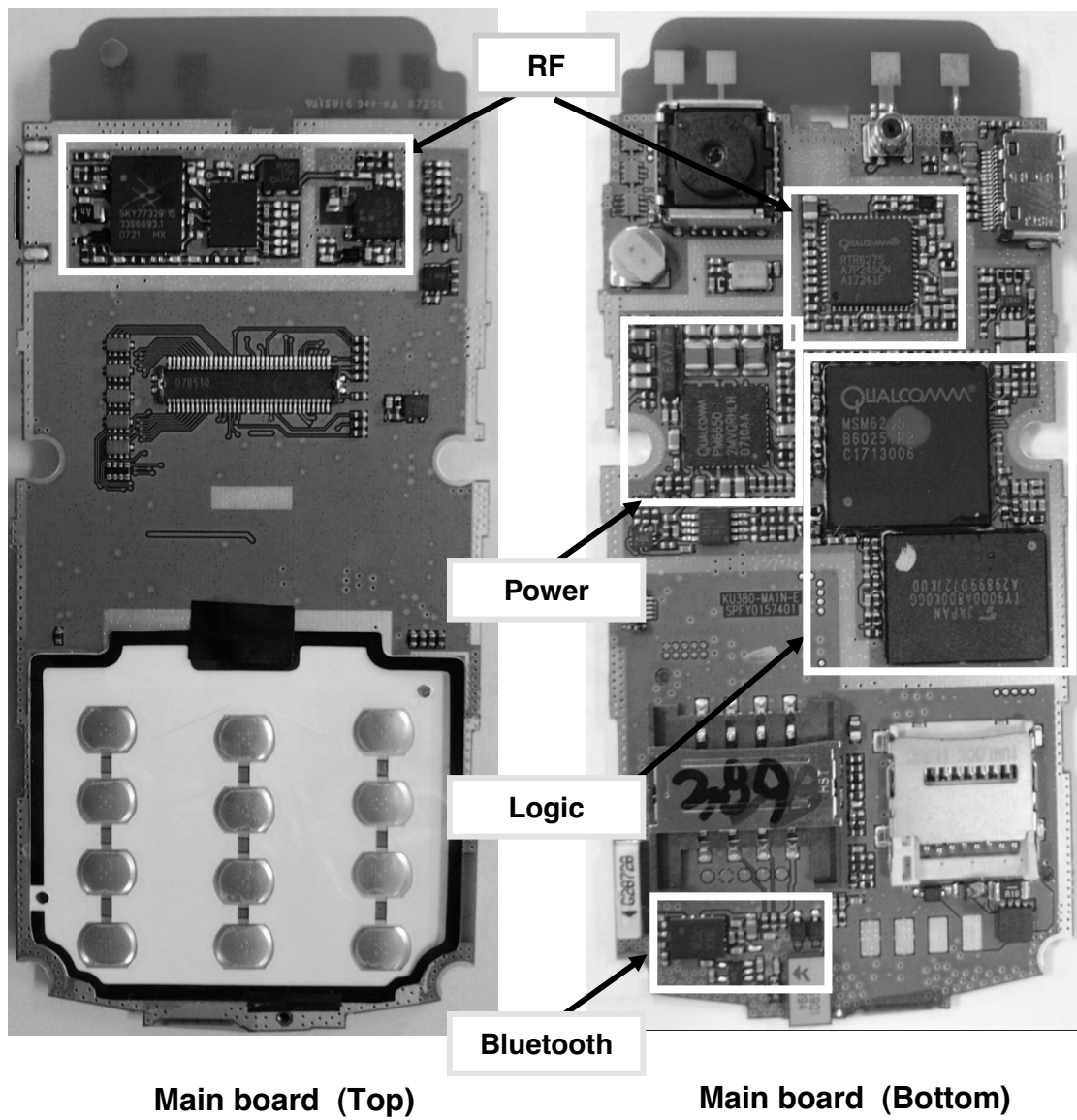
## RF
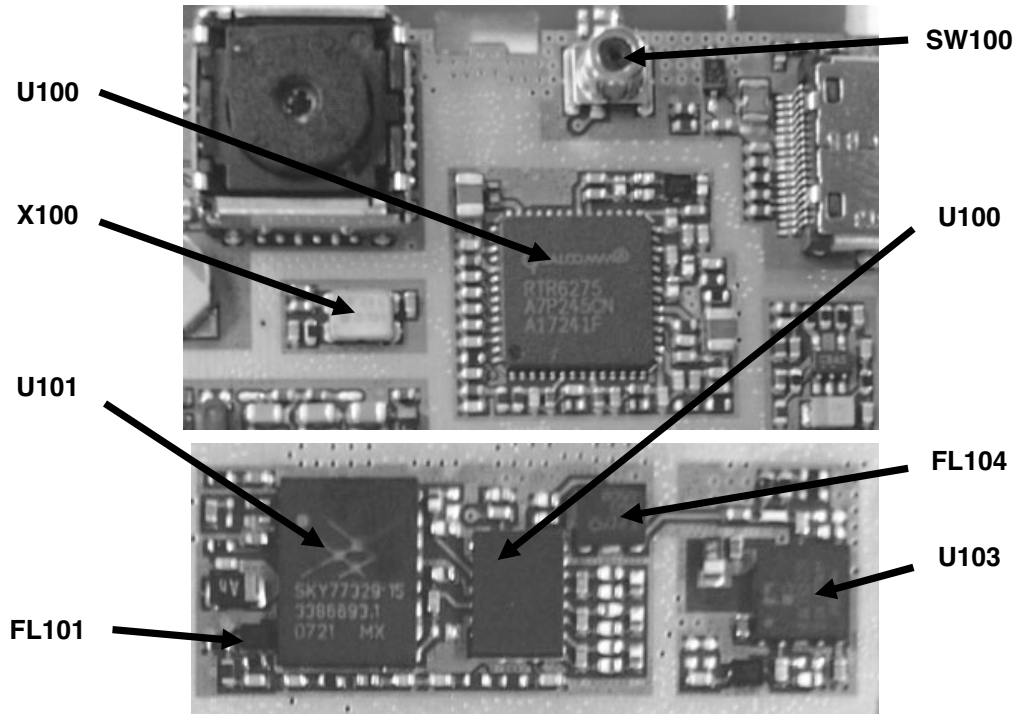


| Reference | Description | Reference | Description |
|-----------|-------------|-----------|-------------|
| SW100 | Ant. Switch module | FL104 | W2100 Duplex |
| U500 | Front End module | U103 | WCDMA PAM |
| U101 | GSM PAM | X100 | VCTCXO |
| FL100 | GSM SAW | M100 | BT module |
| U100 | RTR6275 | | |

## Logic / Audio
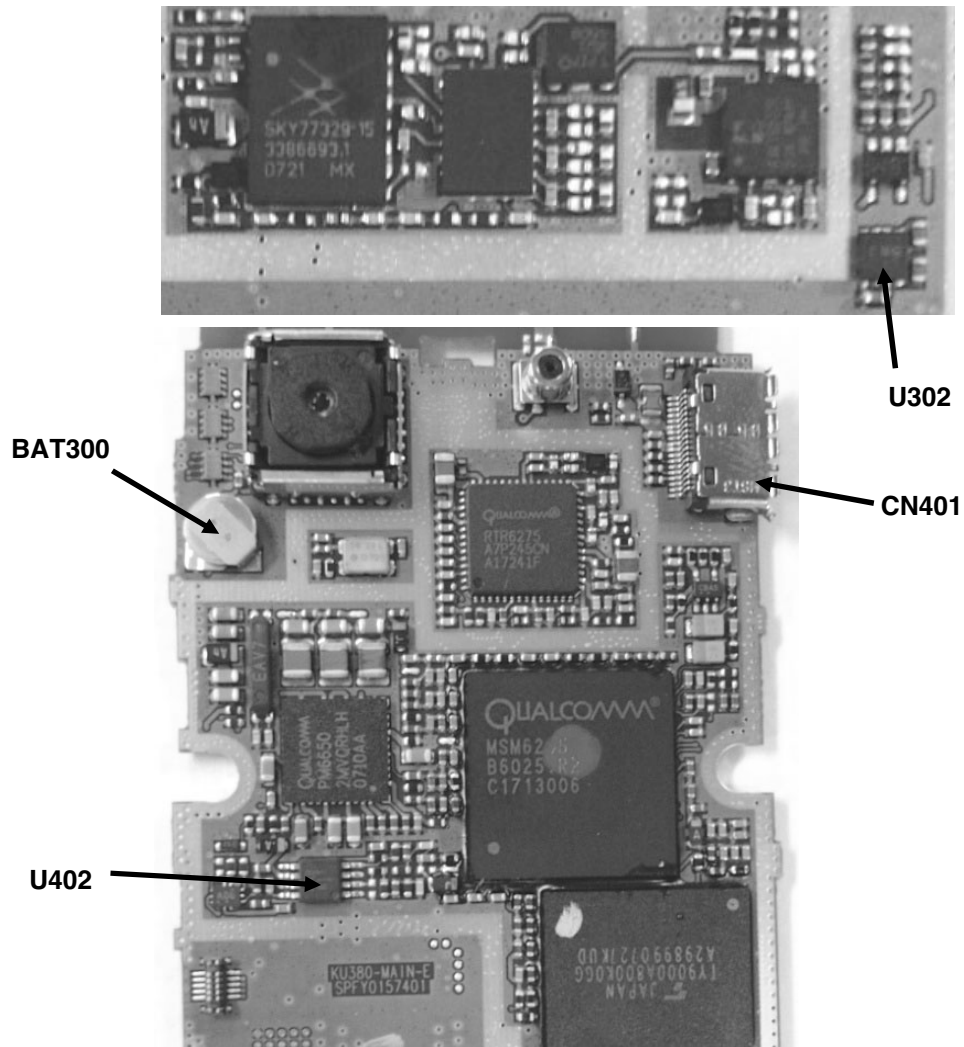


| Reference | Description | Reference | Description |
|-----------|-------------|-----------|------------|
| BAT300 | Backup Battery | CN401 | MMI connector (18pin) |
| U302 | 1.3M Cam. LDO | | |
| U402 | Audio AMP | | |

## Logic
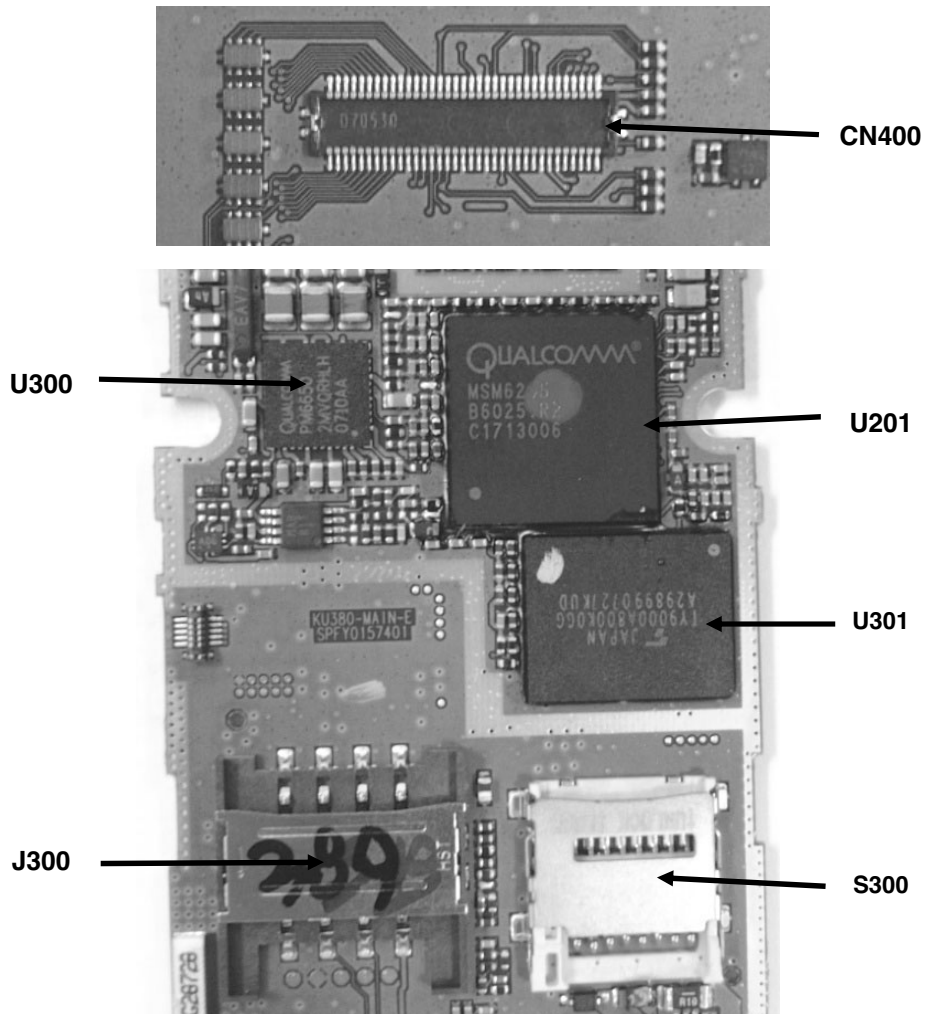


| Reference | Description | Reference | Description |
|-----------|-------------|-----------|------------|
| U201 | MSM6245_A | U300 | PMIC |
| U301 | Memory MCP | J300 | U-SIM socket |
| CN400 | Main To LCD Connector | S300 | T-FLASH socket |

# 4. TROUBLE SHOOTING

## 4.1 RF Component

### BOTTOM SIDE
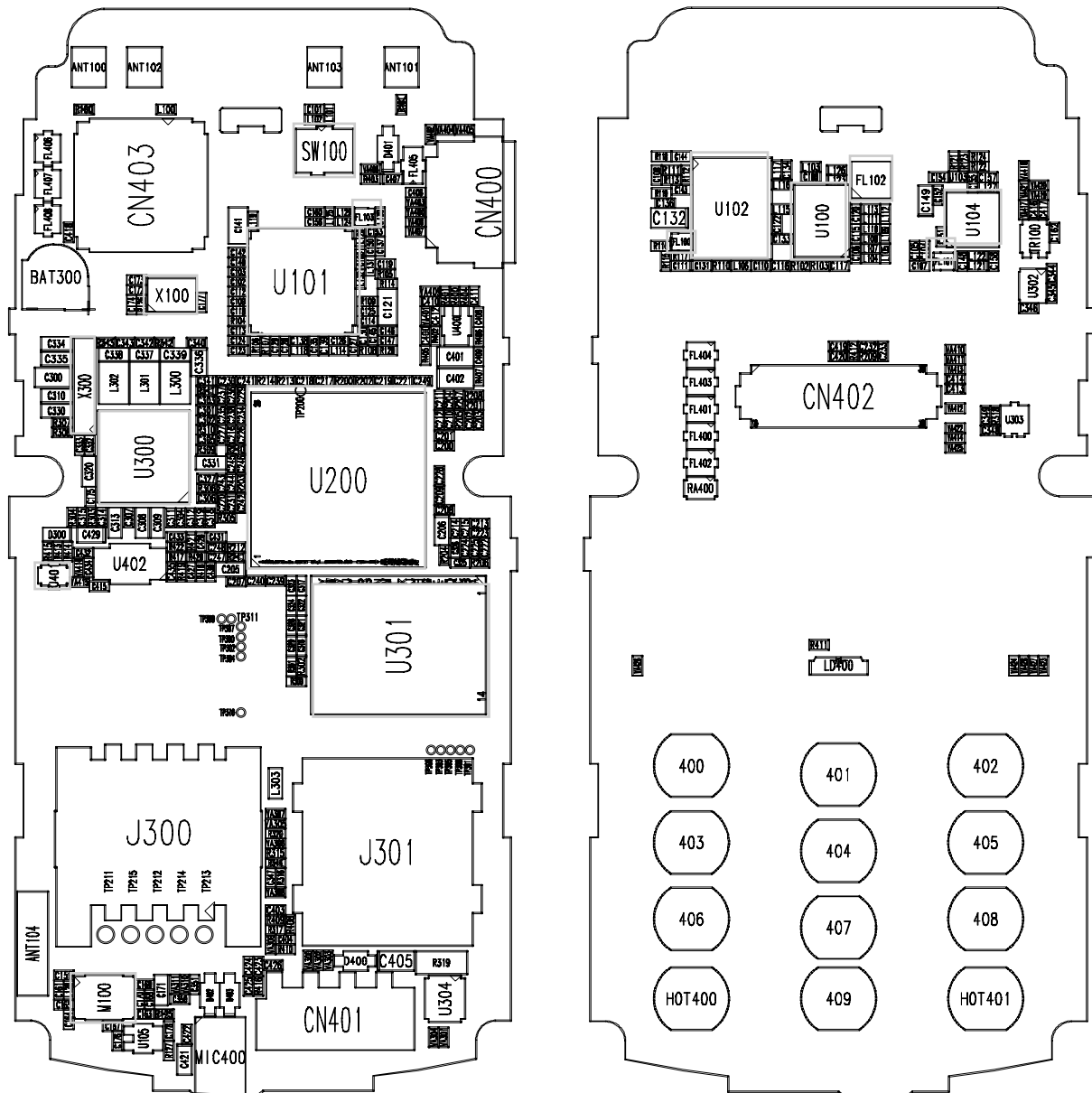
# 4. TROUBLE SHOOTING

| Block Diagram Block | Ref. Name | Part Name | Function | Comment |
|---|---|---|---|---|
| Common | U200 | MSM6245 | Main Control | Main Chipset |
| | X300 | MC-146_7pF | Sleep Clock | 32.768 kHz |
| | U300 | PM6650-2M | Power Control | Power Supply |
| | U401 | NCP2890DMR2G | Speaker AMP | AMP |
| | U100 | D5011 | Switch | Band select |
| | U301 | HYC0UEH0MF3P | Memory | 512M/512M |
| | SW100 | KMS-507 | Test Connector | Calibration, etc |
| | X100 | DSA321SCE-19.2MHz | VCTCXO | 19.2MHz |
| Bluetooth | M100 | LBRQ-2B43A | Bluetooth RF Transceiver | Bluetooth TRX |
| | U101 | RTR6275 | UMTS/GSM Transceiver | TRX |
| | FL103 | EFCH2140TDE1 | UMTS2100 RX SAW filter | RX |
| | FL102 | ACMD-7602 | UMTS 2100 Duplexer | TRX |
| | U104 | AWT6277R | UMTS PA | TX |
| | FL102 | EFCH1950TDF1 | UMTS 2100 TX SAW Filter | TX |
| GSM | U101 | SKY77329 | TX Dual PAM | TX |
| | FL100 | EFCH897MTDB1 | GSM900 TX SAW Filter | TX |

## 4.2 SIGNAL PATH_UMTS RF
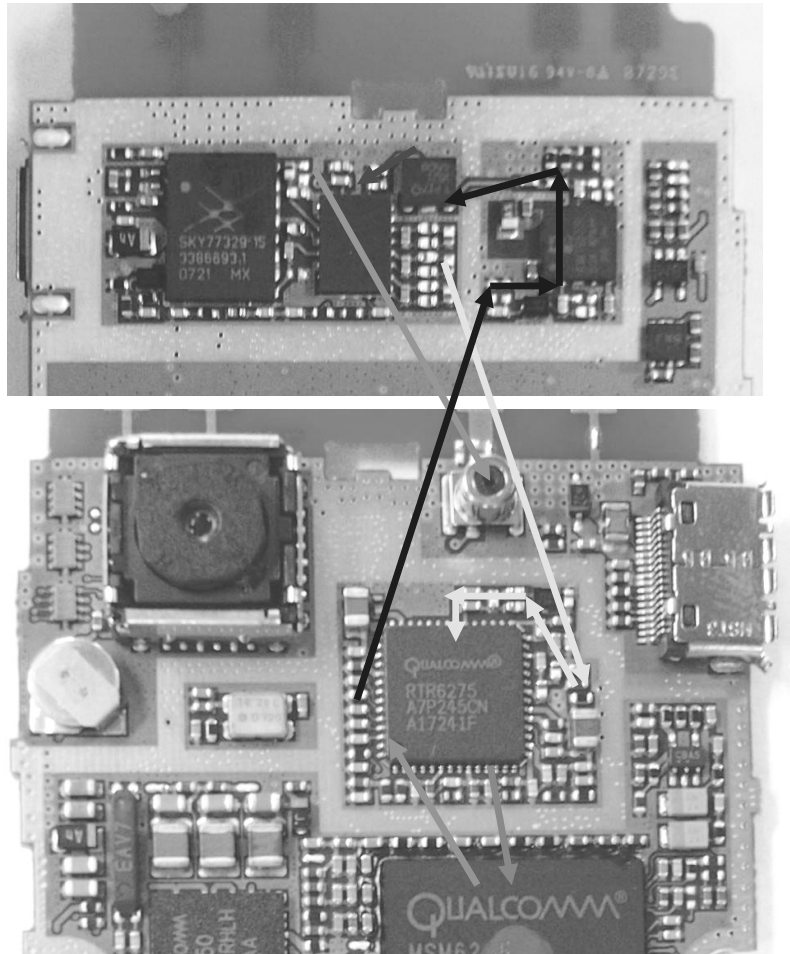


| | |
|---|---|
| → | **Common Tx/Rx** |
| → | **UMTX 2100 Tx/Rx** |
| → | **UMTX 2100 Tx** |
| → | **UMTX 2100 Rx** |
| → | **Tx I/Q** |
| → | **RX I/Q** |

## 4.3 SIGNAL PATH_GSM RF
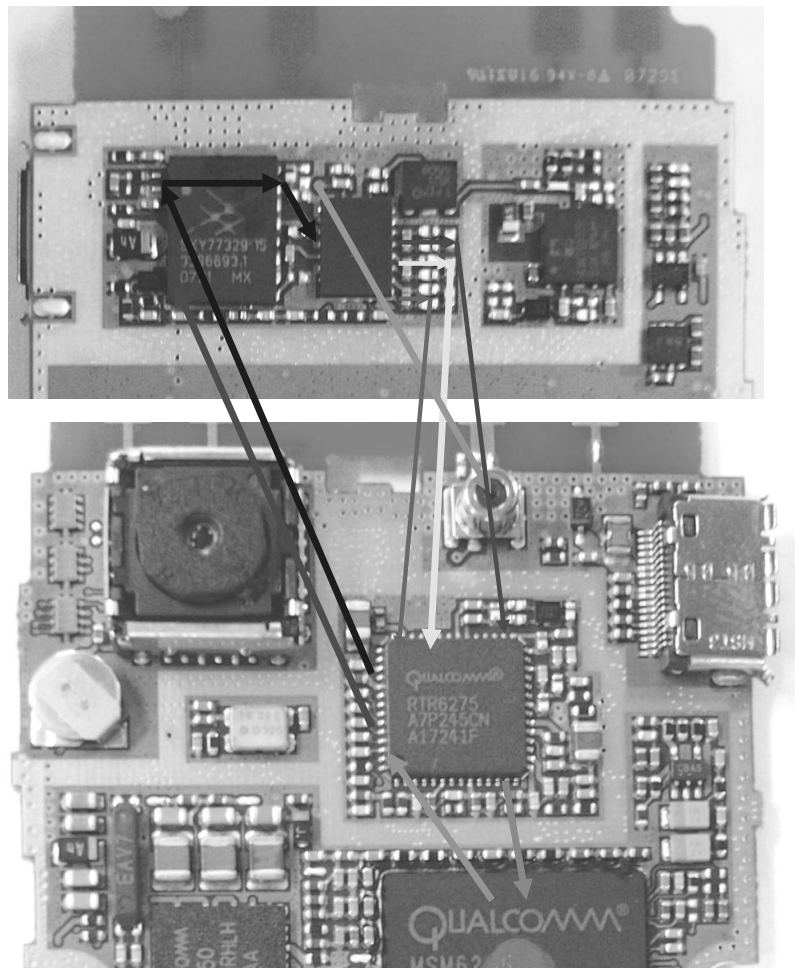


| | |
|---|---|
| ⟶ | **Common Tx/Rx** |
| ⟶ | **GSM900 Tx** |
| ⟶ | **DCS/PCS Tx** |
| ⟶ | **EGSM900 RX** |
| ⟶ | **PCS Rx** |
| ⟶ | **DCS RX** |
| ⟶ | **Tx I/Q** |
| ⟶ | **RX I/Q** |

## 4.4 Checking VC-TCXO Block

The reference frequency (19.2MHz) from X100 (VC-TCXO) is used in UMTS TX part, GSM part and BB part.

Schematic of the VC-TCXO Block
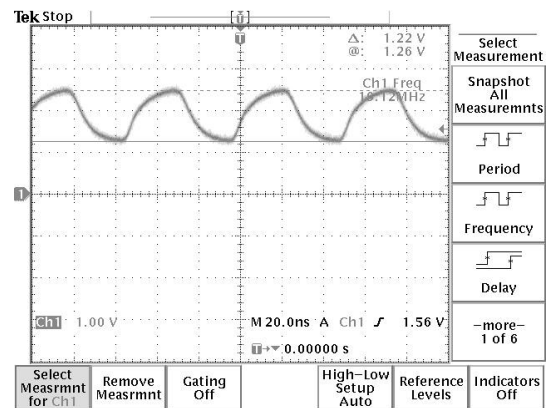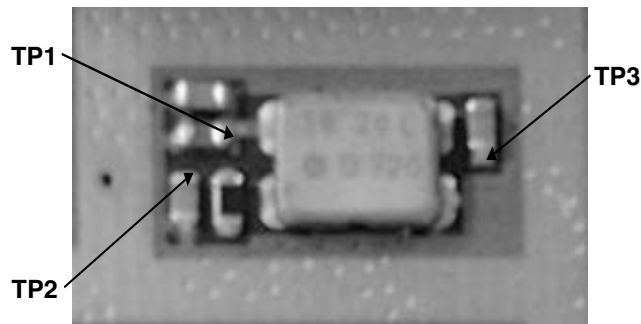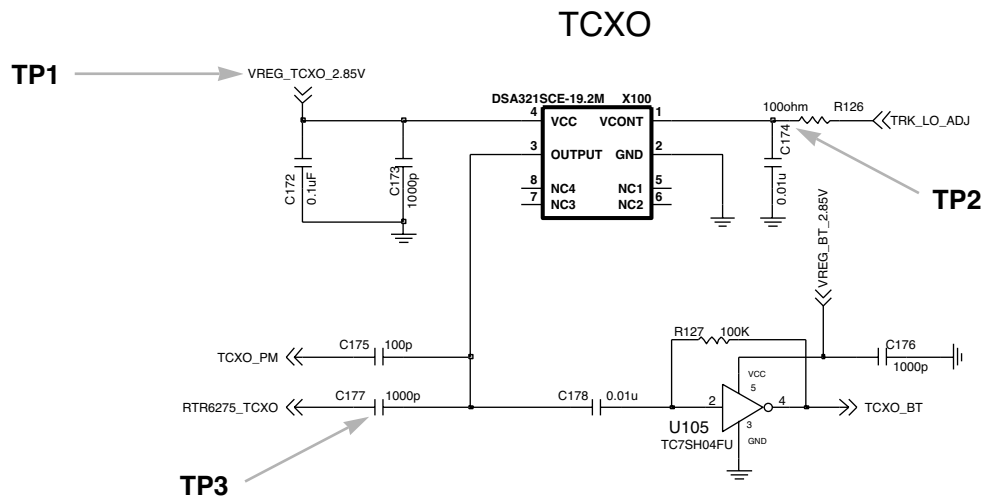


Test Point of the VC-TCXO Block

# 4. TROUBLE SHOOTING

```
┌─────────────────────┐
│   Check TP1         │
│   VCC of TCXO       │
└─────────────────────┘
          │
          ▼
      ◇───────────◇         NO
      │ VCC ≥ 2.8 V │ ─────────────►  ┌──────────────────────────┐
      ◇───────────◇                   │ Check C312 of PMIC (U300) │
          │ YES                       └──────────────────────────┘
          ▼
┌─────────────────────┐
│   Check TP2         │
│   TRK_LO_ADJ        │
└─────────────────────┘
          │
          ▼
      ◇────────────────◇     NO
      │ 2V ≥ Voltage ≥ 1V │ ─────────►  ┌──────────────────────────┐
      ◇────────────────◇                │ Check R212 of MSM (U200)  │
          │ YES                         └──────────────────────────┘
          ▼
┌─────────────────────┐
│   Check TP3         │
│   With Oscilloscope │
└─────────────────────┘
          │
          ▼
      ◇────────────────◇     NO
      │ 2V ≥ Voltage ≥ 1V │ ─────────►  ┌──────────────────────────┐
      ◇────────────────◇                │ Check soldering          │
          │ YES                         │ and components           │
          ▼                             └──────────────────────────┘
┌─────────────────────┐
│   TCXO is OK        │
│   Check other part  │
└─────────────────────┘
```
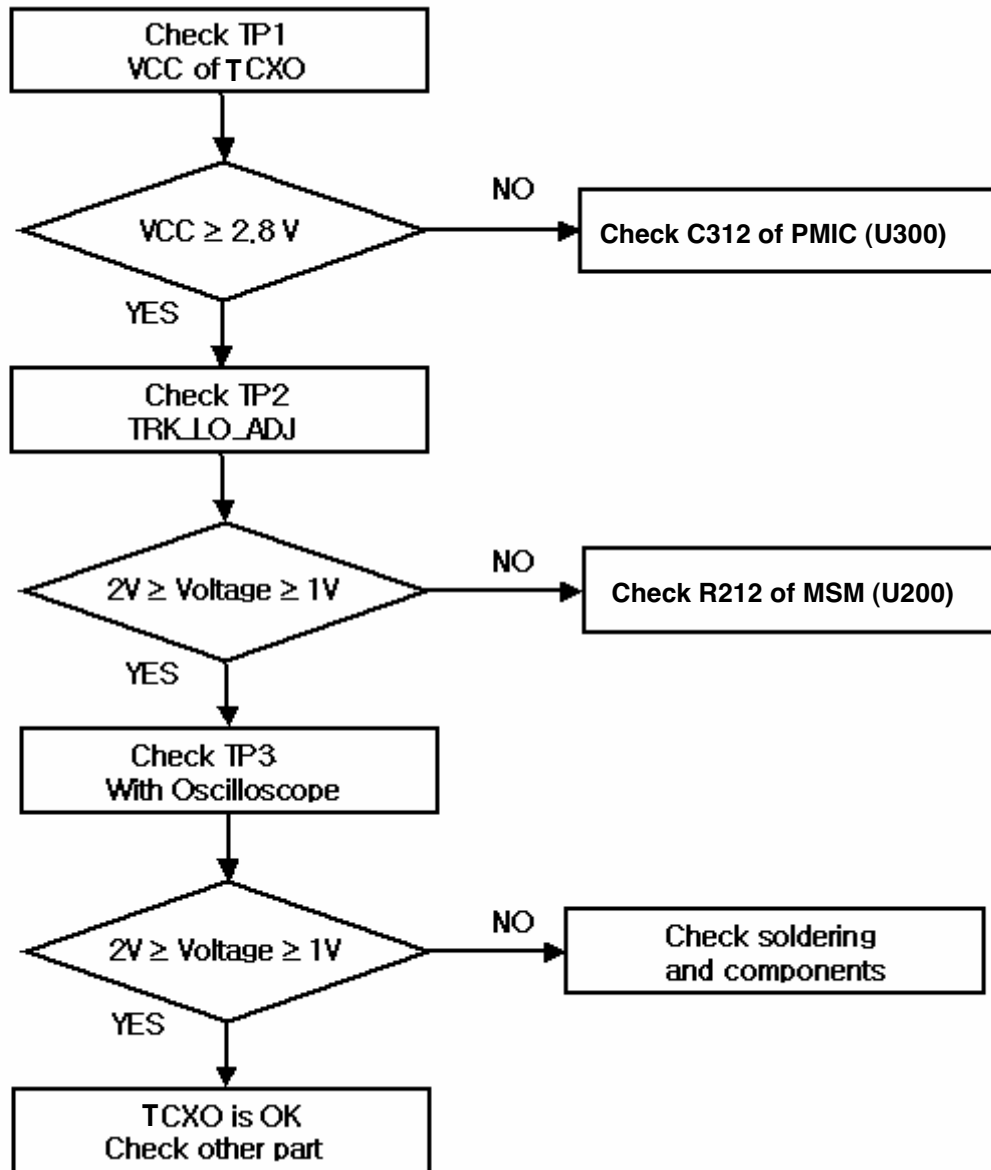
## 4.5 Checking Front-End Module Block
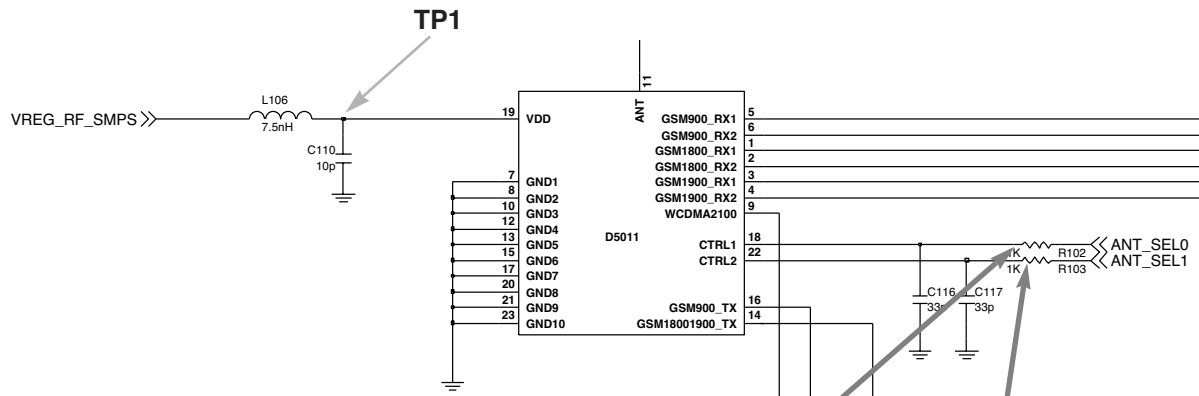


**Schematic of the Front-End Module Block**
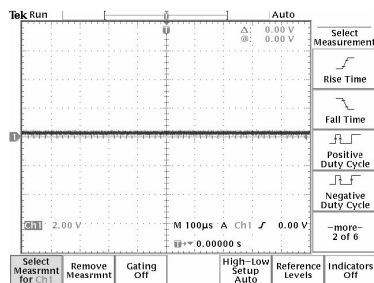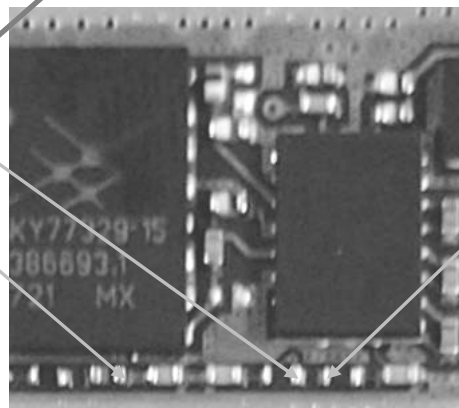


**Test Point of the Front-End Module Block**
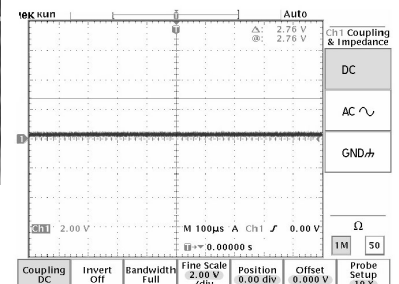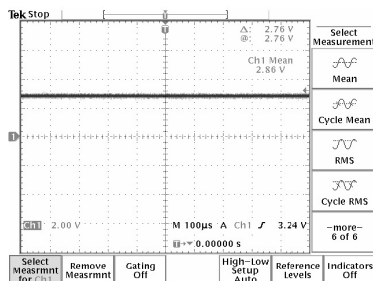
# 4. TROUBLE SHOOTING

**Logic Table of the FEM**

|  | ANT_SEL0 | ANT_SEL1 |
|---|---|---|
| GSM 1800/GSM 1900 RX | LOW | LOW |
| GSM 850/ GSM 900 RX | HIGH | LOW |
| GSM 850/GSM 900 TX/ WCDMA | LOW | HIGH |
| GSM 1800/GSM 1900 TX | HIGH | HIGH |

Check Soldering of
ANT_SEL0, 1      High Level

1.8V < Voltage < 3.0V

NO → Check VCC
TP1 VREG_RF_SMPS

YES

Check the Logic
in each mode
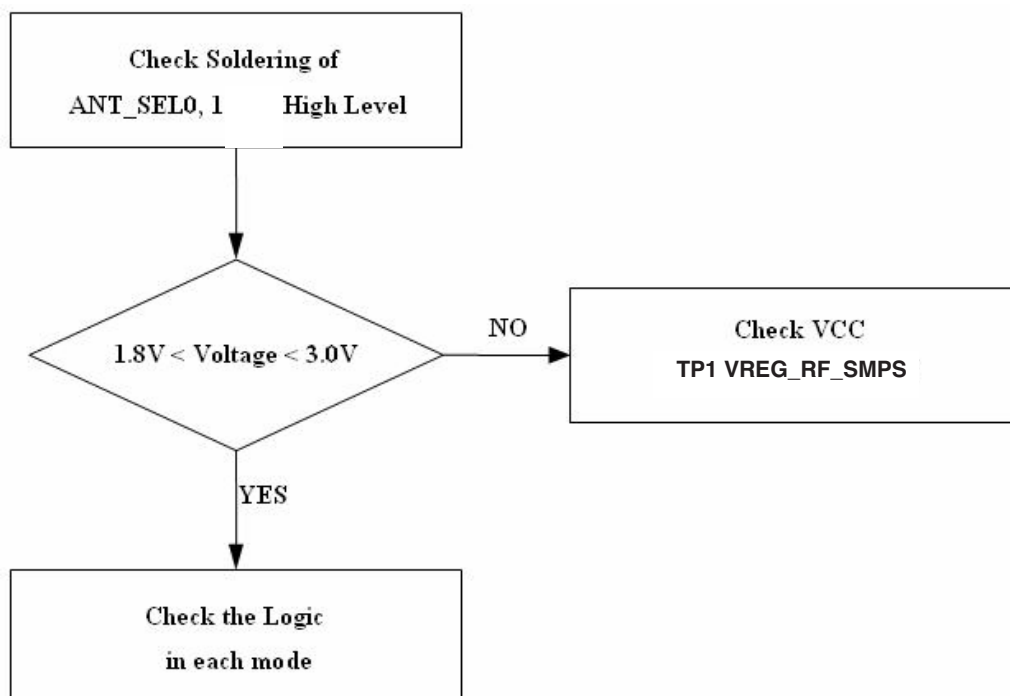
## 4.6 Checking UMTS Block

### 4.6.1 Checking Tx level

# 4. TROUBLE SHOOTING

```
                    ┌─────────────────────┐
                    │ Run a FTM program   │
                    │ set RF mode to IMT  │
                    │ set uplink freq. To │
                    │ 9750 click Tx on and│
                    │ WCDMA set PA range  │
                    │ RD on set Tx AGC to │
                    │        410          │
                    └─────────────────────┘
```

Check a current over 500mA?  — YES → Check TP1 over 25dBm?  — NO → Check coupler  U103

Check a current over 500mA?  — NO → Check TP4 over -5dBm?

Check TP1 over 25dBm?  — YES → Check TP2 over 23dBm?

Check TP4 over -5dBm?  — NO → Check Tx SAW Filter

Check TP4 over -5dBm?  — YES → Check PAM block

Check TP2 over 23dBm?  — NO → Check Duplexer  FL102

Check TP2 over 23dBm?  — YES → Check TP3 over 22dBm?

Check TP3 over 22dBm?  — NO → Check FEM  U100

Check TP3 over 22dBm?  — YES → Tx is OK Check other parts

## 4.6.2 Checking UMTS PAM Control Block

### · PAM control signal

1. PWR_DET : UMTS Tx Power Detected value (Check R120)

2. TX_AGC_ADJ : UMTS RTR6275 Tx Amp Gain Control

3. VREG_TCXO_2.85V : UMTS PAM enable (C170) (about 2.85V)

4. +VPWR : UMTS PAM Main Voltage ( 3V < +VPWR < 4.2V)

5. PA_ON : Turns the PA on and off

6. PA_R0 : Control signals that step the active PA mode and bias

## 4.6.3 Checking RF Rx Level

```
┌─────────────────────┐
│ Set the Phone Rx is ON │
└─────────────────────┘
           │
           ▼
      ╱Check Vbias╲      NO     ┌──────────────────┐
     ╱ over 2V?    ╲──────────▶│ Check bias        │
      ╲           ╱            │ Block soldering   │
           │ YES               └──────────────────┘
           ▼
      ╱Check TP1 ╲       NO     ┌──────────────────┐
     ╱Signal exist?╲────────────▶│ Check the RF S/W  │
      ╲           ╱            └──────────────────┘
           │ YES
           ▼
      ╱Check TP2 ╲       NO     ┌──────────────────┐
     ╱Signal exist?╲────────────▶│ Check FEM         │
      ╲           ╱            └──────────────────┘
           │ YES
           ▼
      ╱Check TP3 ╲       NO     ┌──────────────────┐
     ╱Signal exist?╲────────────▶│ Check the Duplexer│
      ╲           ╱            └──────────────────┘
           │ YES
           ▼
      ╱Check TP4 ╲       NO     ┌──────────────────┐
     ╱Signal exist?╲────────────▶│ Check the RTR6275 │
      ╲           ╱            └──────────────────┘
           │ YES
           ▼
   ┌──────────────────┐
   │ Rx is OK          │
   │ Check other Parts │
   └──────────────────┘
```
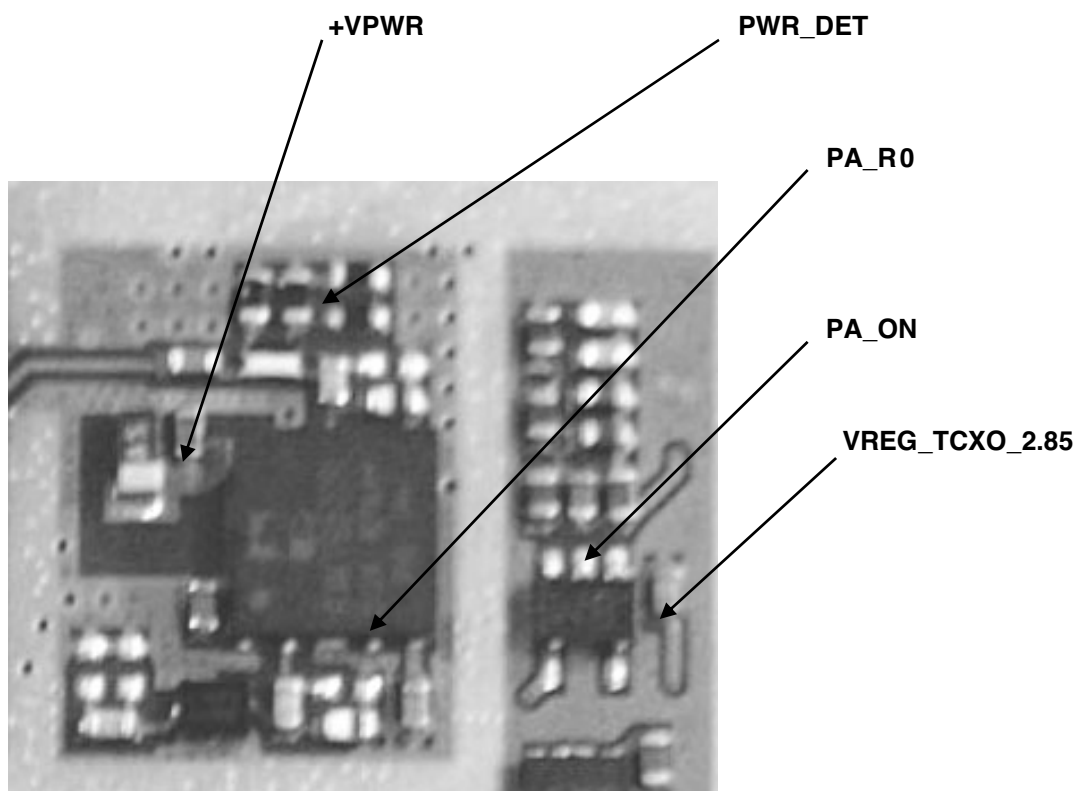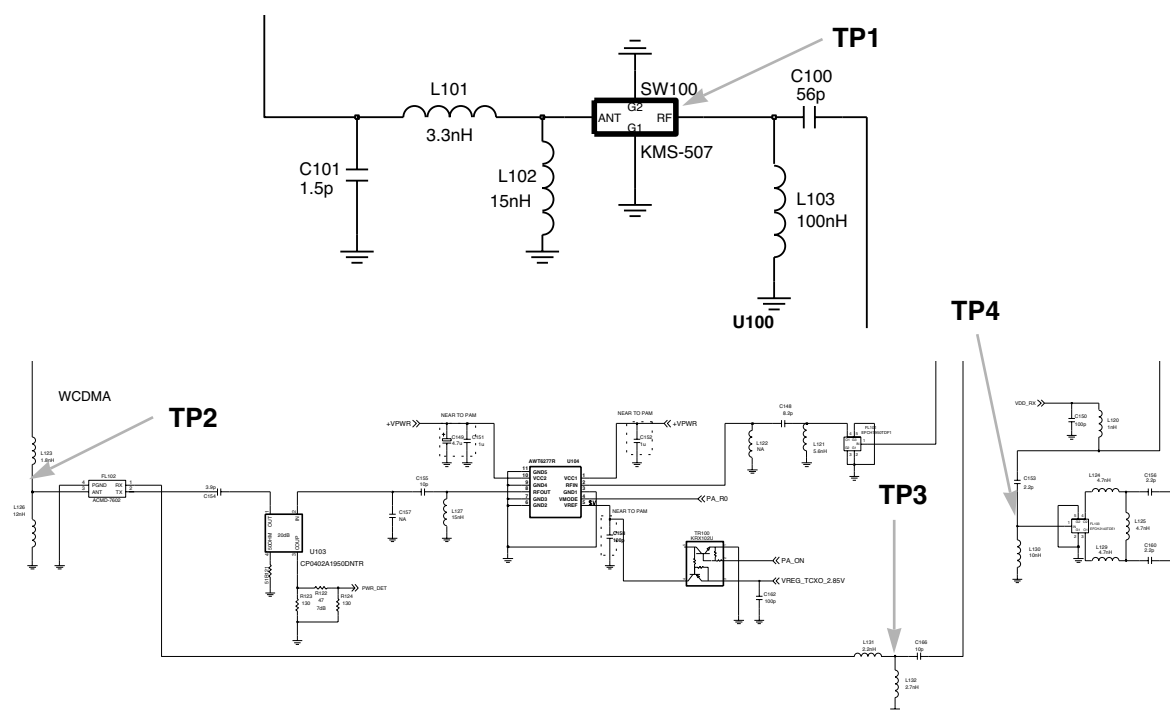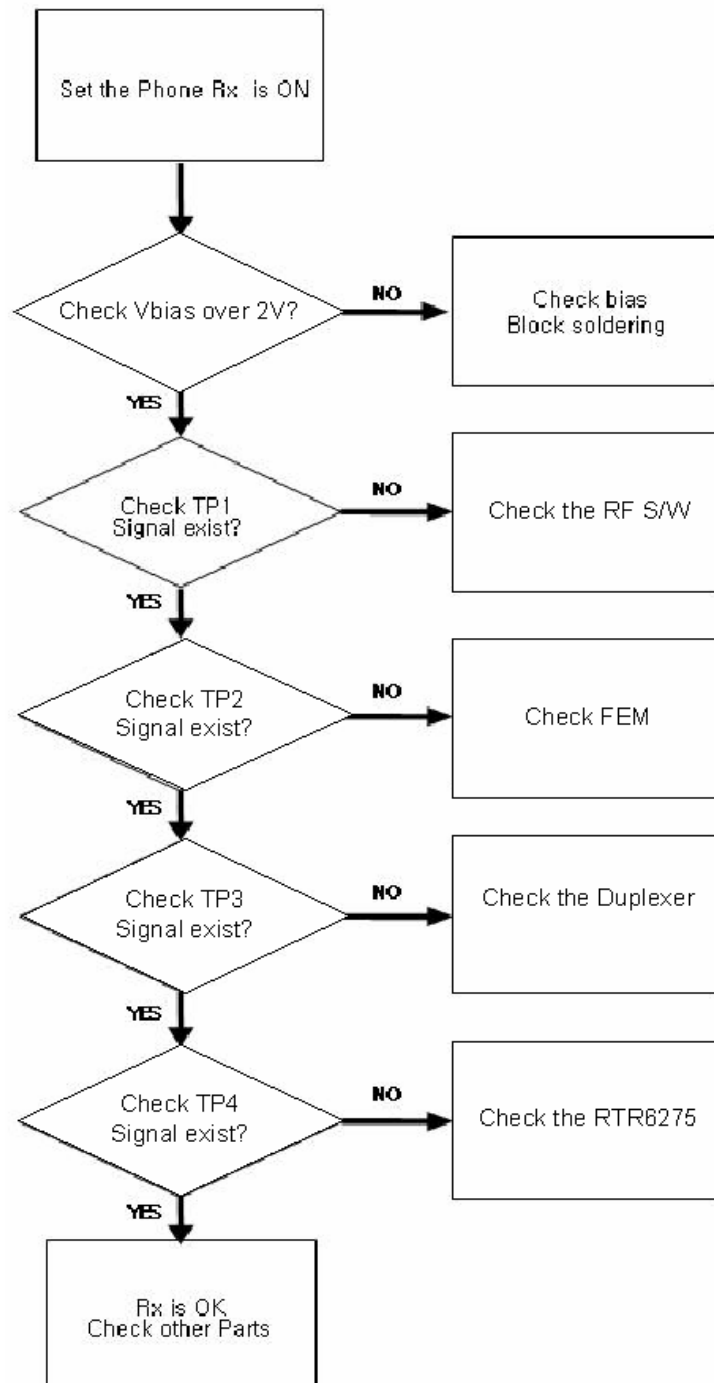
## 4.7 Checking GSM Block
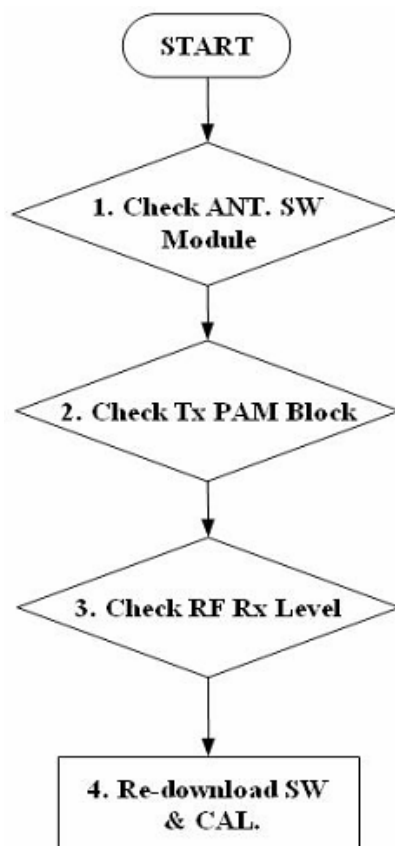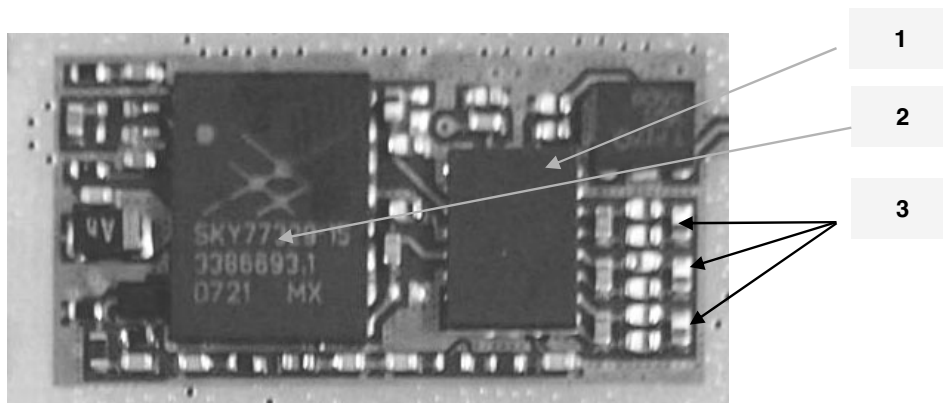
## 4.7.1 Checking RF Tx level
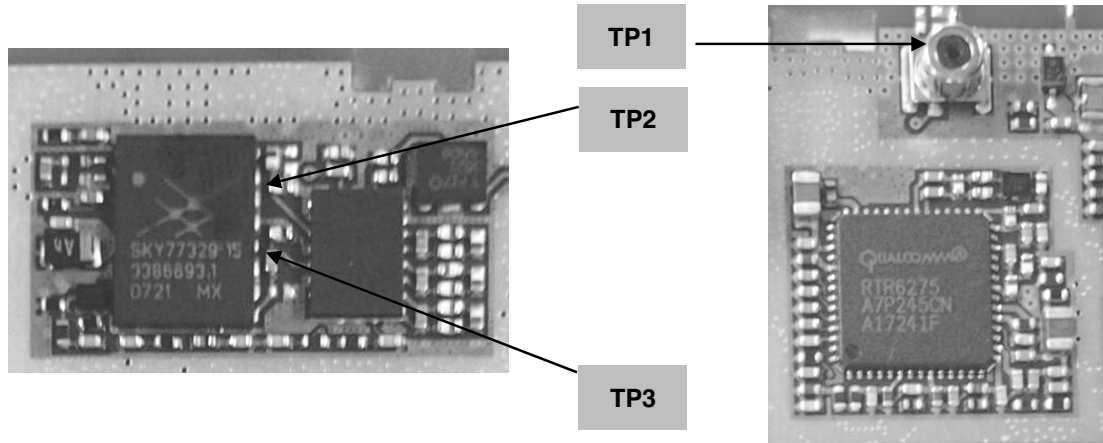


## 3.7.2 Schematic of RF Tx level



| | | |
|---|---|---|
| GSM 850/ GSM 900 RX | HIGH | LOW |
| GSM 850/GSM 900 TX/ WCDMA | LOW | HIGH |
| GSM 1800/GSM 1900 TX | HIGH | HIGH |

## 4.7.3 Checking RF Tx level

```
                    ┌──────────────┐
                    │    START     │
                    └──────┬───────┘
                           │
                           ▼
            ╱ Check TP1 ╲           ┌─────────────────────┐
           ╱ If GSM900 over 31dBm? ╲  YES  │ GSM900/DCS/PCS      │
           ╲ If DCS/PCS over 28dBm? ╱ ────► │ Tx is OK            │
            ╲          ╱             │ Check the other part│
                 │ NO                └─────────────────────┘
                 ▼
            ╱ Check TP2, TP3 ╲       ┌─────────────────────┐
           ╱ If GSM900 over 29dBm? ╲  YES  │ Check the ANT SW    │
           ╲ If DCS/PCS over 25dBm? ╱ ────► │ Module              │
            ╲          ╱             └──────────┬──────────┘
                 │ NO                           │
                 ▼                              ▼
            ╱ Check PAM Block OK? ╲     ┌─────────────────────┐
           ╱ Refer to chapter 3.5.2 ╲ YES│ Check the RTR6275    │
           ╲                     ╱ ──►  └─────────────────────┘
                 │ NO
                 ▼
       ┌─────────────────────────┐
       │ Check Soldering of PAM  │
       │ Block                   │
       │ If problems still exit, │
       │ replace the PAM         │
       └───────────┬─────────────┘
                 │ NO
                 ▼
            ╱ Problems resolved? ╲   YES  ┌─────────────────────┐
           ╲                    ╱ ────►  │ GSM900/DCS/PCS      │
                 │ NO                    │ Tx is OK            │
                 ▼                       └─────────────────────┘
       ┌─────────────────────┐
       │ Change the Board    │
       └─────────────────────┘
```

## 4.7.4 Checking PAM Block

TP1. GSM_PA_RAMP : Power Amp Gain Control. typically, 0.2V < Vramp < 1.6V

TP2. GSM_PA_EN : Power Amp Enable
  (Power ON : higher than 1.25V , Power OFF : lower than 0.4V)

TP3. GSM_PA_BAND : Power Amp Band Selection Control
  (GSM Mode : -0.2V < VBS < 0.4V , DCS/PCS Mode : 1.25V < VBS < 3.0V)

TP4. +VPWR : PAM Supply Voltage Vcc higher than 3.0V
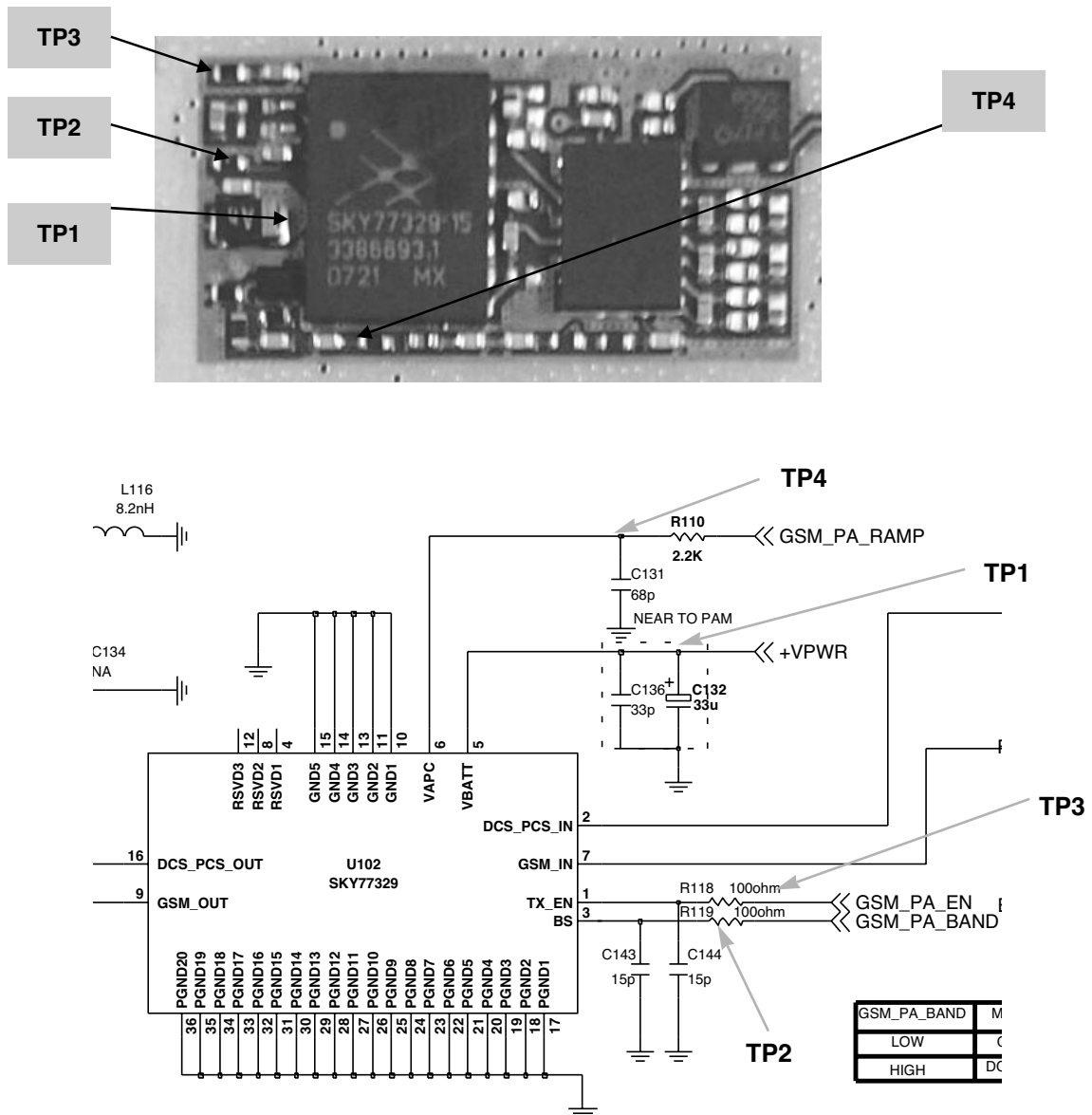




**Schematic of GSM PAM Block**

# 4. TROUBLE SHOOTING

## 4.7.5 Checking RF Rx Block
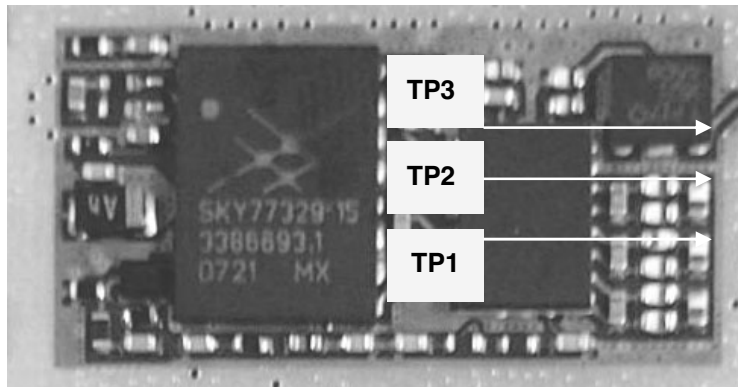


TP1. DCS RX INPUT
TP2. PCS RX INPUT
TP3. GSM RX INPUT
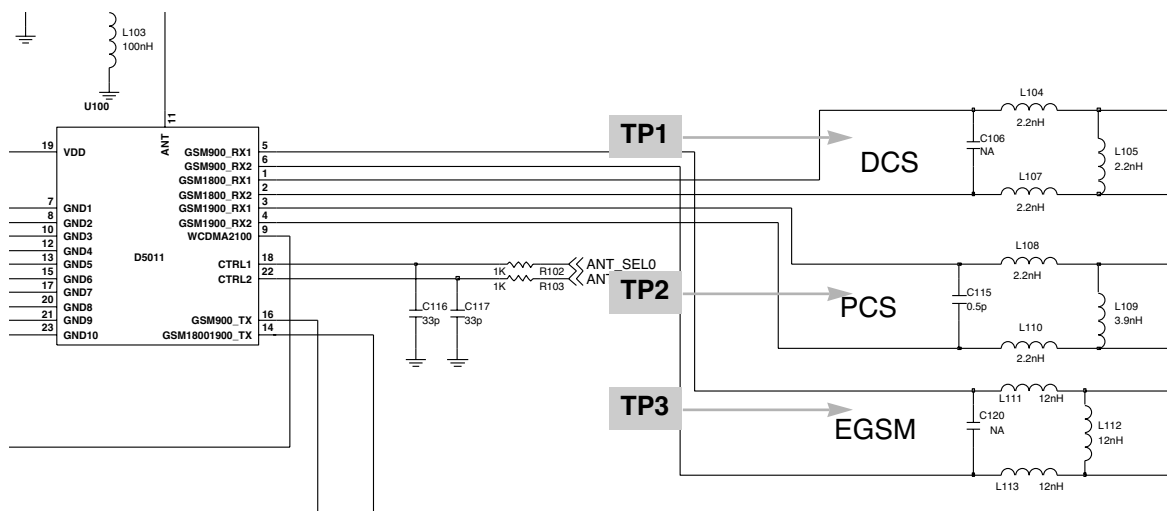


**Schematic of GSM900/DCS/PCS Rx Block**

```
                          ┌─────────────────┐
                          │      START      │
                          └─────────────────┘
                                   │
                                   ▼
                              ╱─────────╲                    ┌──────────────────┐
                            ╱             ╲       NO          │   Check ANT.SW   │
                          ╱  TP1,TP2,TP3,TP4 ╲ ──────────────▶│    Module and    │
                           ╲ Signals exits? ╱                 │ soldering of TPs │
                            ╲             ╱                    └──────────────────┘
                              ╲─────────╱
                                   │ YES
                                   ▼
                              ╱─────────╲                    ┌──────────────────┐
                            ╱             ╲       NO          │  GSM900/DCS/PCS  │
                          ╱ Rx still has    ╲ ──────────────▶│     Rx is OK     │
                           ╲  problems?     ╱                 └──────────────────┘
                            ╲             ╱
                              ╲─────────╱
                                   │ YES
                                   ▼
                          ┌─────────────────┐
                          │  Re-download &  │
                          │   Calibration   │
                          └─────────────────┘
```
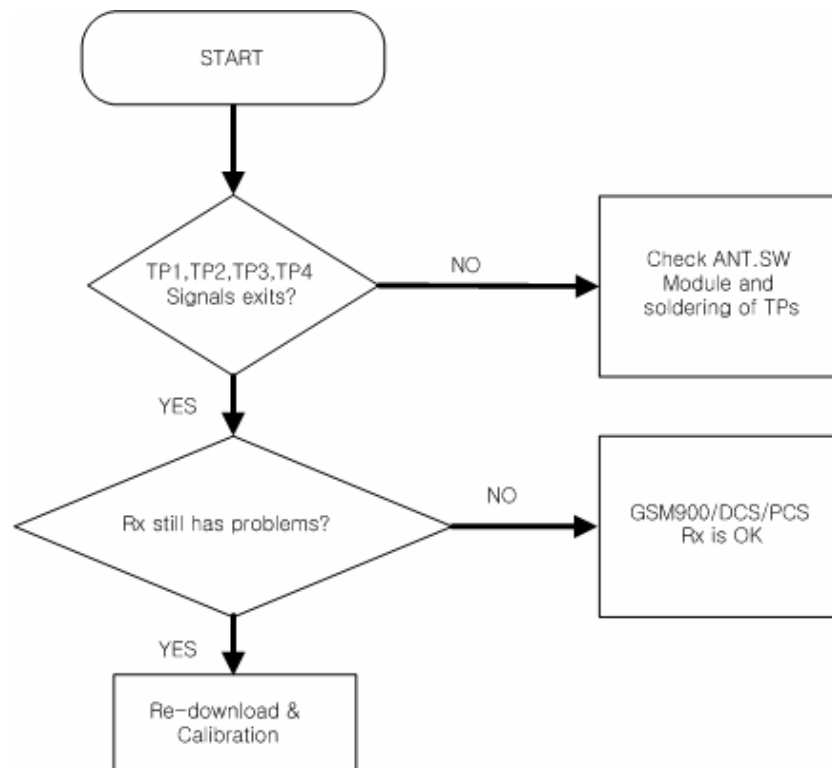
## 4.8 Checking Bluetooth Block
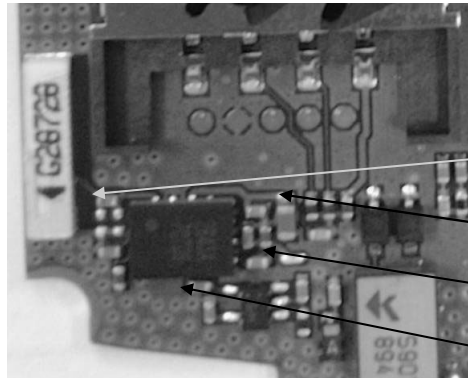
TP1. VREG_BT_2.85V
TP2. VREG_MSMP_2.7V
TP3. TCXO_BT
TP4. BT ANT Output



**Test Point of the Bluetooth Block**



**Schematic of the Bluetooth Block**

Start

TP1,TP2
Signals exits? — **NO** → Change the Main board

**YES**

TP3
Is clock ok? 19.2M — **NO** → Change the X100

**YES**

TP4
Signals exits? — **NO** → Change the M100

**YES**

Change the Main board
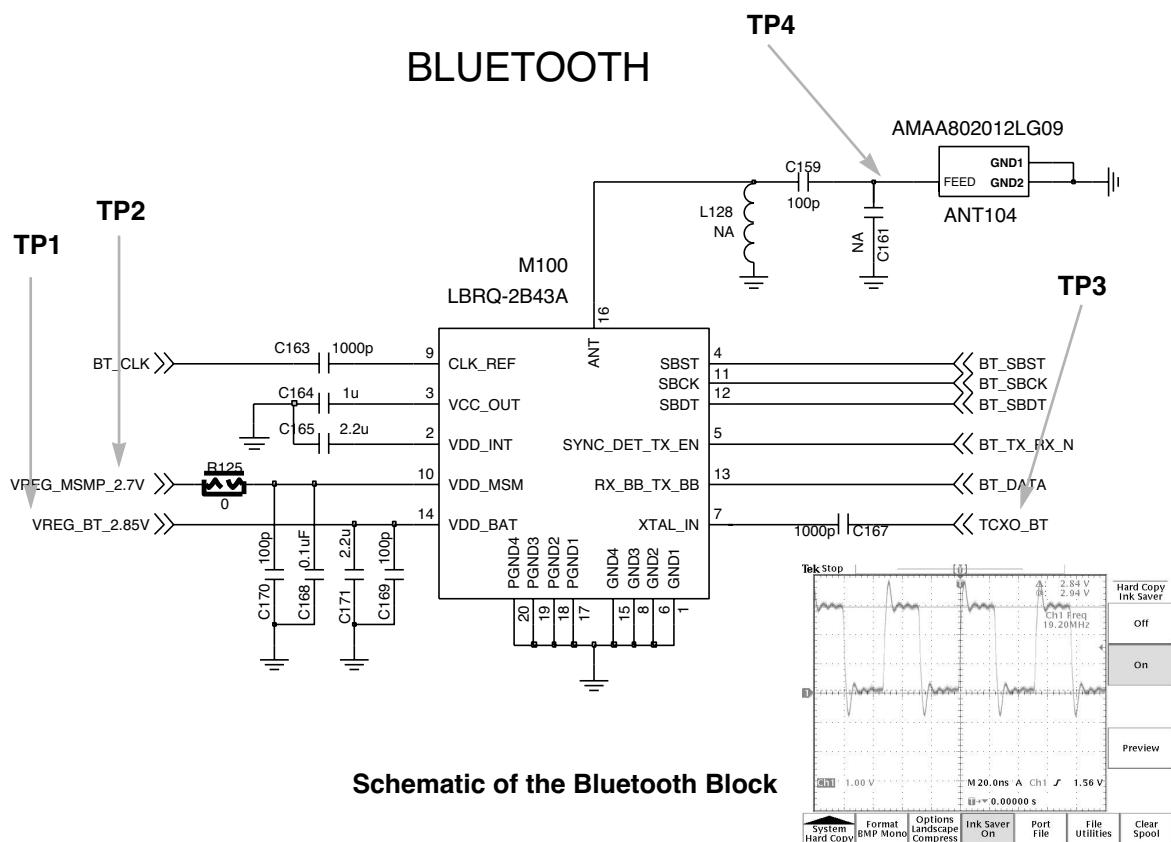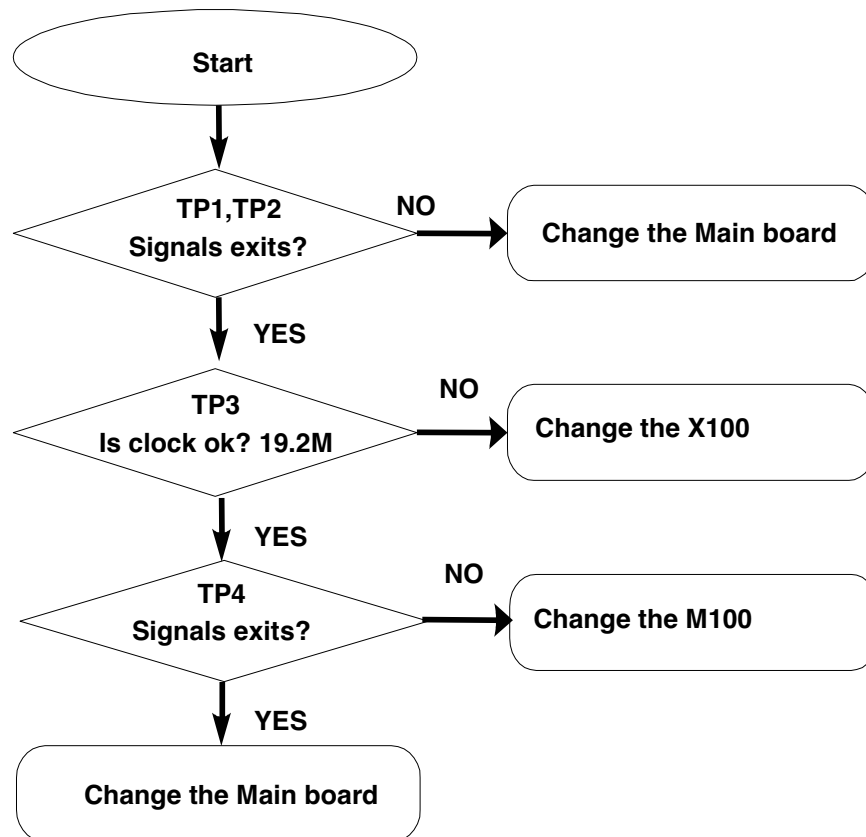
# 4. TROUBLE SHOOTING

## 4.9 Power ON Troubleshooting

Power On sequence of KU380 is :

PWR key press → PM_ON_SW_N go to low, PM6650 KPDPWR_N (pin24) → PM6650 Power Up → VREG_MSMC_1.2V, VREG_MSME_1.8V, VREG_MSMP_2.7V, VREG_MSMA_2.6V, VREG_TCXO_2.85V power up and system reset assert to MSM6245 → Phone booting and PS_HOLD assert to PMIC

```
                    ┌─────────────┐
                    │    Start    │
                    └─────────────┘
                          │
                  ┌───────────────┐      NO    ┌──────────────────┐
                  │ Battery voltage.├─────────►│ Change or charging│
                  │ higher than    │           │ the Battery       │
                  │ 3.20V?         │           └──────────────────┘
                  └───────────────┘
                        │ YES
                  ┌───────────────┐      NO    ┌──────────────────┐
                  │  Key press?    ├─────────►│ Check the Key Dome│
                  └───────────────┘           └──────────────────┘
                        │ YES
          ┌──────────────────────────┐  NO   ┌──────────────────┐
          │VREG_MSMC_1.2V,VREG_MSMP_  ├──────►│ Change the Main  │
          │2.7V, VREG_MSME_1.8V,      │       │ board            │
          │VREG_TCXO_2.85V,           │       └──────────────────┘
          │VREG_MSMA_2.6V power up?   │
          └──────────────────────────┘
                        │ YES
                ┌─────────────────┐   NO   ┌──────────────────┐
                │ Is clock ok?    ├───────►│ Check the TXCO   │
                │ R306 : 19.2M    │        └──────────────────┘
                │ X300 : 32.768Khz│
                └─────────────────┘
                        │ YES
                ┌──────────────────┐
                │ Change the Main  │
                │ board            │
                └──────────────────┘
```

VREG_MSME_18V    VREG_MSMC_125V    VREG_RF_SMPS

X300 : 32.768Khz

VREG_MSMA_2.6A    R306 : 19.2Mhz
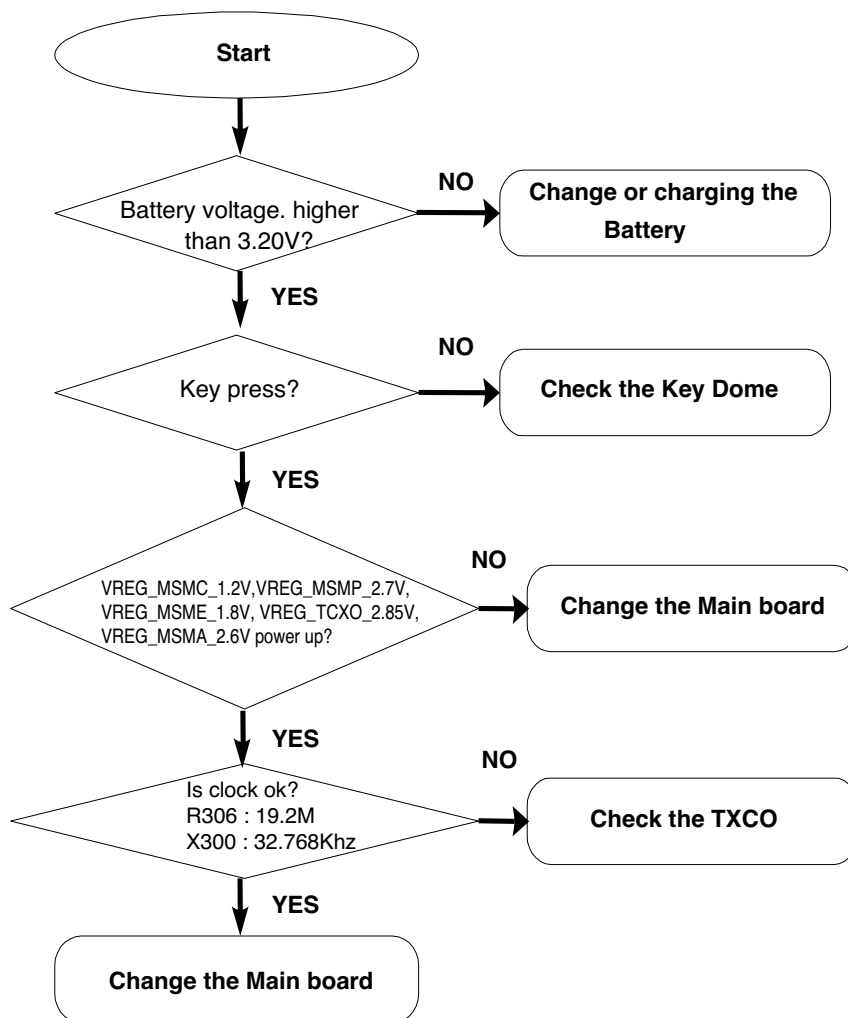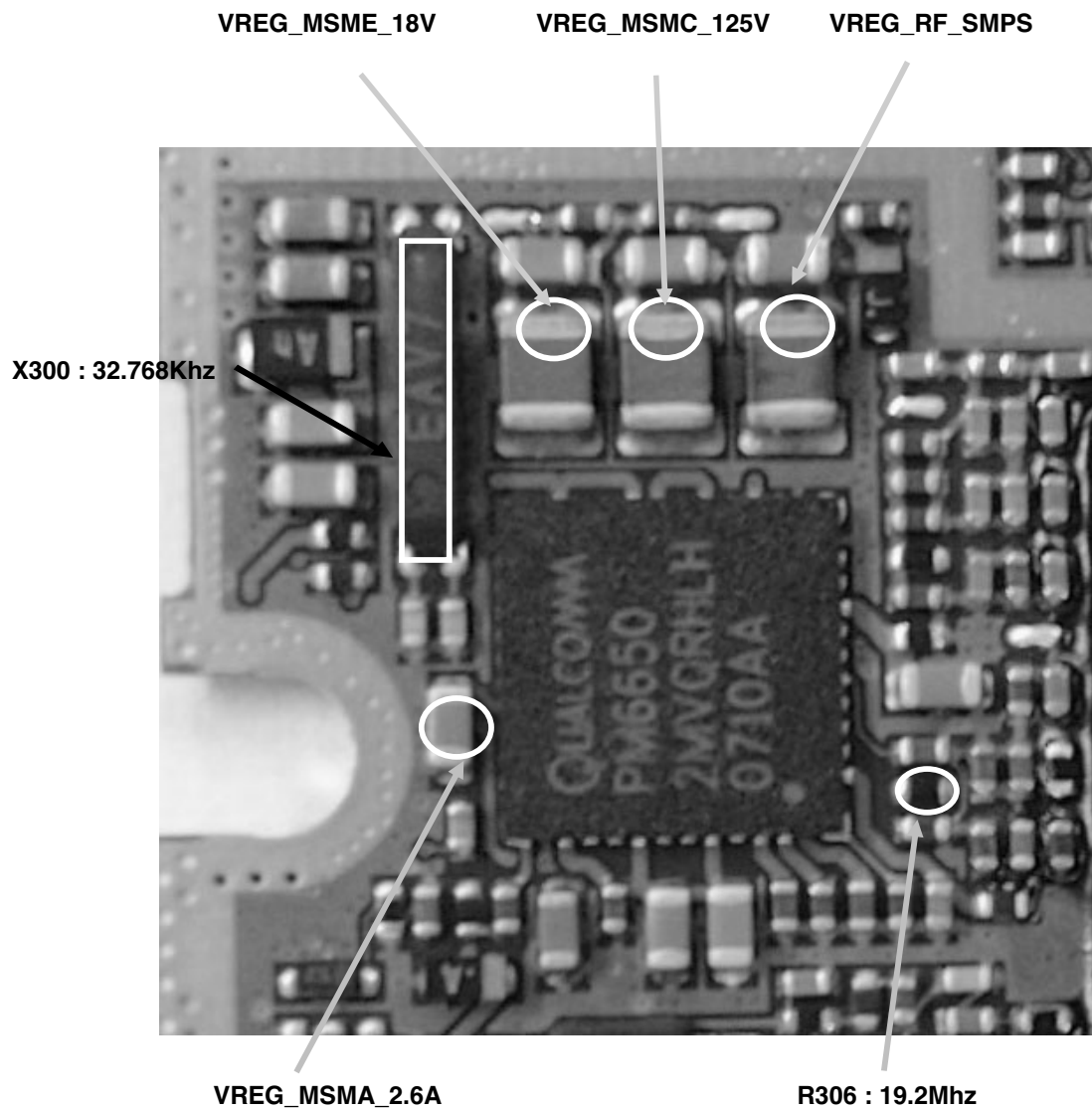
**[ KU380 Main PCB BOTTOM ]**

## 4.10 Charger Troubleshooting
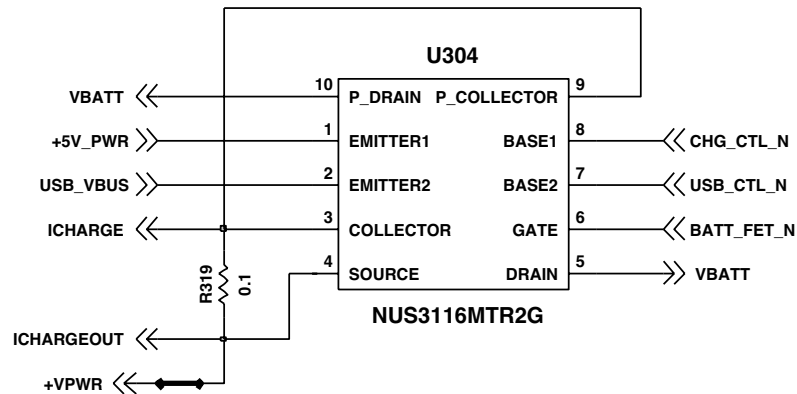


**Charging Procedure**

- Connect TA or USB Cable

- Control the charging current by PM6650 IC

- Charging current flows into the battery

**Troubleshooting Setup**

- Connect TA and battery to the phone

**Check Point**

- Connection of TA or USB Cable

- Charging current path

- Battery

**Troubleshooting Procedure**

- Check the charger (TA or USB Cable) connector

- Check the charging current Path

- Check the battery

```
                    ┌──────────────┐
                    │    Start     │
                    └──────┬───────┘
                           │
                           ▼
            ┌──────────────────────────────┐
            │ Check the pin and battery    │
            │ Connect terminals of I/O     │
            │ connector                    │
            └──────────────┬───────────────┘
                           │
                           ▼
                      ◇ Connection ◇    NO    ┌──────────────────────┐
                      ◇   OK?     ◇──────────▶│ Change I/O connector │
                           │                   └──────────────────────┘
                         Yes │
                           ▼
              ◇ Is the TA (or USB Cable) ◇   NO   ┌──────────────────────┐
              ◇ voltage 5.1V (or 5.0V)?  ◇───────▶│ Change TA            │
                           │                       │ (or USB Cable)       │
                         Yes │                     └──────────────────────┘
                           ▼
              ◇ Is it charging properly ◇   Yes   ┌──────────┐
              ◇ After turning on U304?   ◇────────▶│   END    │
                           │                        └──────────┘
                         NO │
                           ▼
            ┌──────────────────────────────┐
            │      Change the board        │
            └──────────────────────────────┘
```
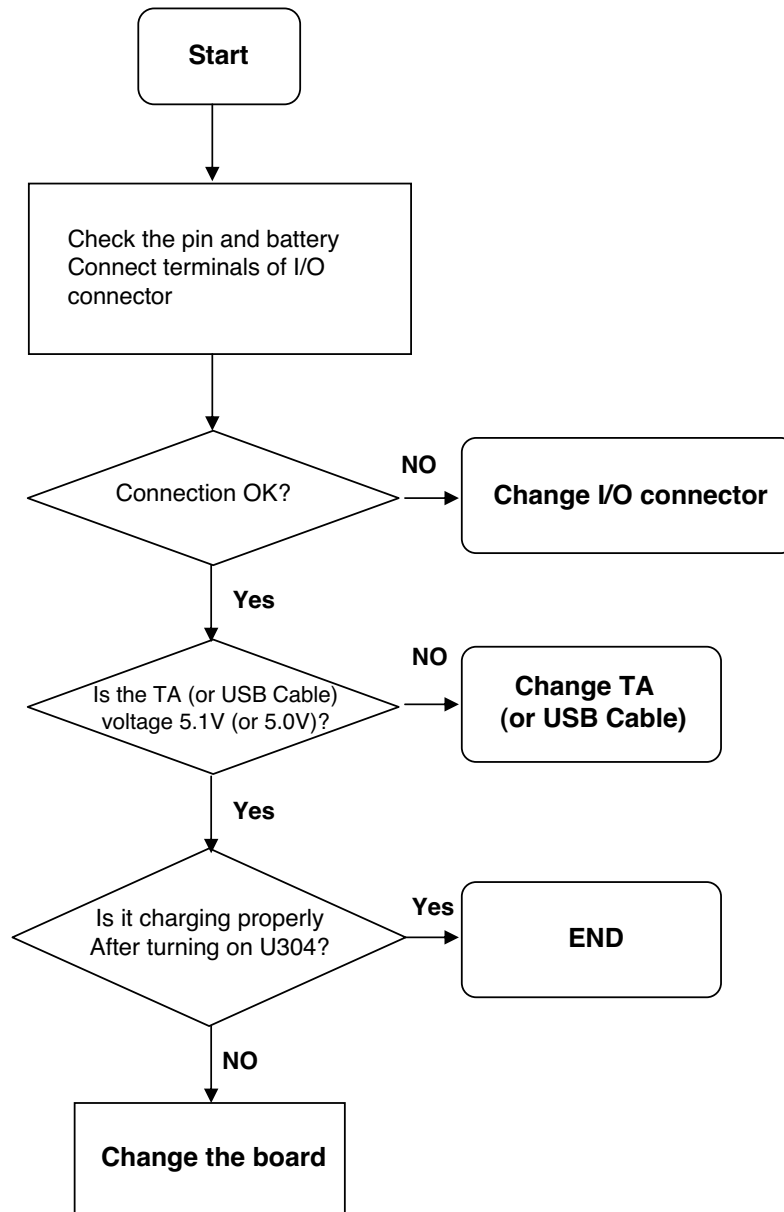
**[ Charger Troubleshooting Flow ]**
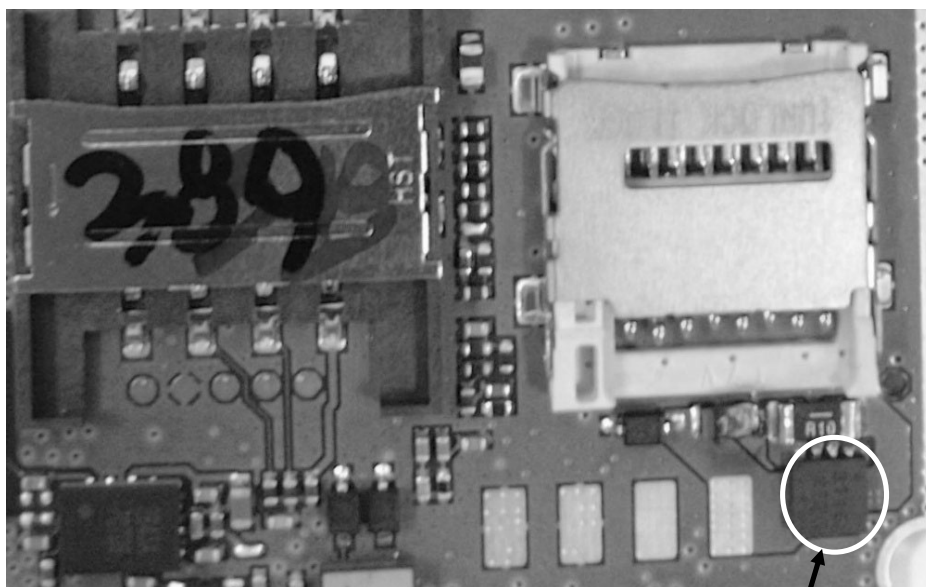
**U304**

**[ Charging part ( Main PCB) ]**

## 4.11 USB Troubleshooting

USB Initial sequence of KU380 is :
USB connected to KU380 power on → USB_VBUS(U304, pin #2) go to 5V → USB_D+ go to 3.3V →
USB_DAT is triggered → USB work.

```
              ┌─────────────────┐
              │      Start      │
              └─────────────────┘
                      │
                      ▼
                ╱ Power is on? ╲ ──NO──→  Go to power on trouble shooting
                ╲             ╱
                      │ YES
                      ▼
              ╱ Cable is inserted? ╲ ──NO──→  Insert cable
              ╲                   ╱
                      │ YES
                      ▼
             ╱ U304, pin #2 is 5V? ╲ ──NO──→  Check U304 (pin #2)
             ╲                    ╱
                      │ YES
                      ▼
               ╱ USB_D+ is 3.3V? ╲ ──NO──→  Check VA302
               ╲                 ╱
                      │ YES
                      ▼
              Change the Main board
```
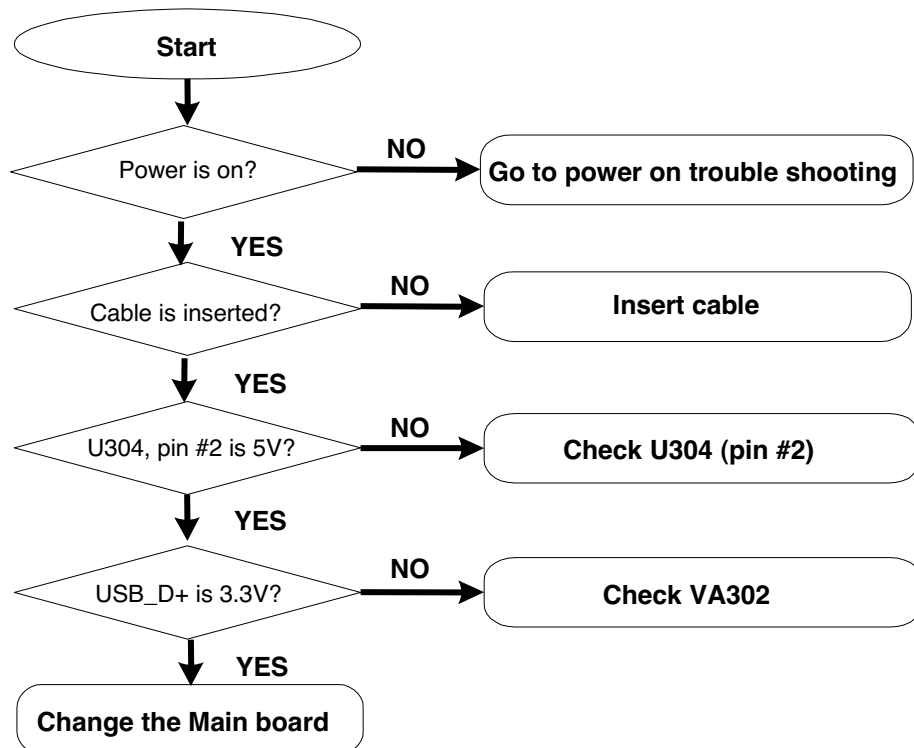
## 4.12 SIM Detect Troubleshooting

USIM Initial sequence of KU380 is :
USIM_CLK,USIM_RST,USIM_DATA triggered → VREG_UIM_2.85V go to 2.8V → USIM IF work

```
                    ┌─────────────┐
                    │    Start    │
                    └──────┬──────┘
                           │
                    ┌──────▼──────────┐
                    │ Re-insert the SIM card │
                    └──────┬──────┘
                           │
                      ◇ Work well? ◇──Yes──▶ ┌──────┐
                           │                  │ End  │
                           │ No               └──────┘
                           │
            ◇ VREG_UIM_2.85V is 2.85V? ◇──NO──▶ ┌──────────┐
            ◇ USIM_P_CLK is run?       ◇         │ Check J300 │
                           │                     └──────────┘
                           │ YES
                    ┌──────▼──────┐
                    │ Change SIM card │
                    └──────┬──────┘
                           │
                      ◇ Work well? ◇──Yes──▶ ┌──────┐
                           │                  │ End  │
                           │ No               └──────┘
                    ┌──────▼──────────┐
                    │ Change the Main board │
                    └─────────────────┘
```

- 100 -
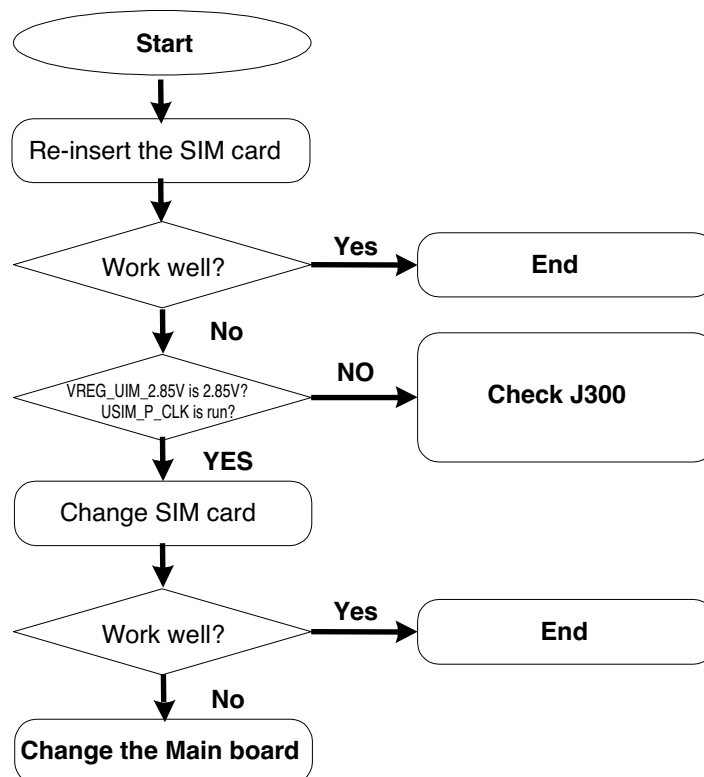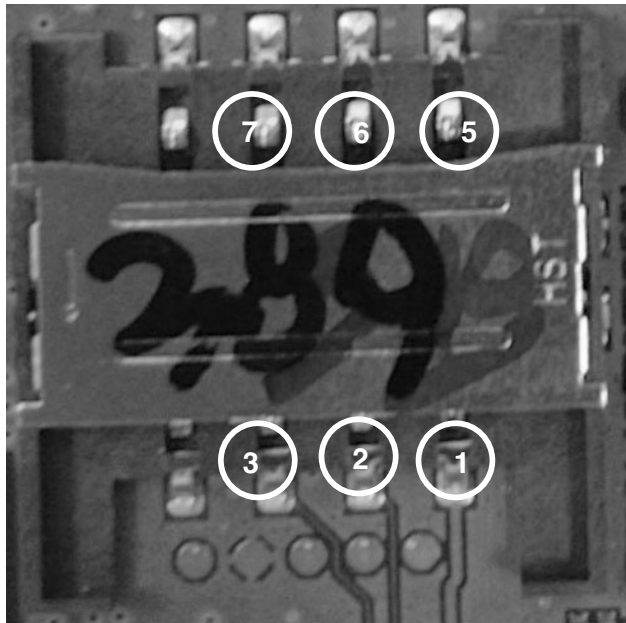
|   |   |
|---|---|
| 1 | **VREG_USIM_2.85V** |
| 2 | **USIM_P_RST_N** |
| 3 | **USIM_P_CLK** |
| 7 | **USIM_P_DATA** |

## USIM



**Figure. USIM part schematics**

## 4.13 Camera Troubleshooting

Camera control signals are generated by MSM6245.

### 4.13.1 MEGA CAMERA

```
                        ┌─────────────┐
                        │    Start    │
                        └──────┬──────┘
                               ↓
              ┌─────────────────────────────────┐
              │  Check the camera connector and  │
              │       reconnect the camera       │
              └────────────────┬─────────────────┘
                               ↓
                                              Yes
              ◇ Camera is OK? ◇ ─────────────────→  ┌─────────────┐
                               │                     │     END     │
                               ↓ NO                  └─────────────┘
                                              NO
         ◇ VREG_CAM_AVDD_2.8V            ─────────→  ┌──────────────────────┐
           VREG_CAM_DVDD_1.8V is                     │ Change the Main board │
                  2.8V? ◇                            └──────────────────────┘
                               ↓ Yes
                                              NO
           ◇ Check the CAM_MCLK ◇  ─────────────→   ┌──────────────────────┐
                               │                     │ Change the Main board │
                               ↓ Yes                 └──────────────────────┘
              ┌─────────────────────────────────┐
              │        Change the camera         │
              └────────────────┬─────────────────┘
                               ↓
                                              Yes
              ◇ Camera is OK ◇ ──────────────────→  ┌─────────────┐
                               │                     │     END     │
                               ↓ NO                  └─────────────┘
              ┌──────────────────────┐
              │ Change the Main board │
              └──────────────────────┘
```
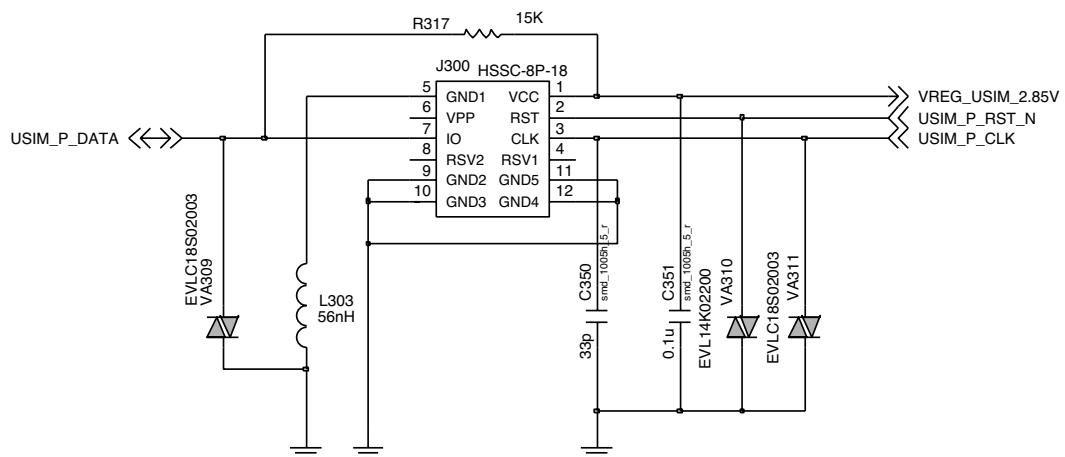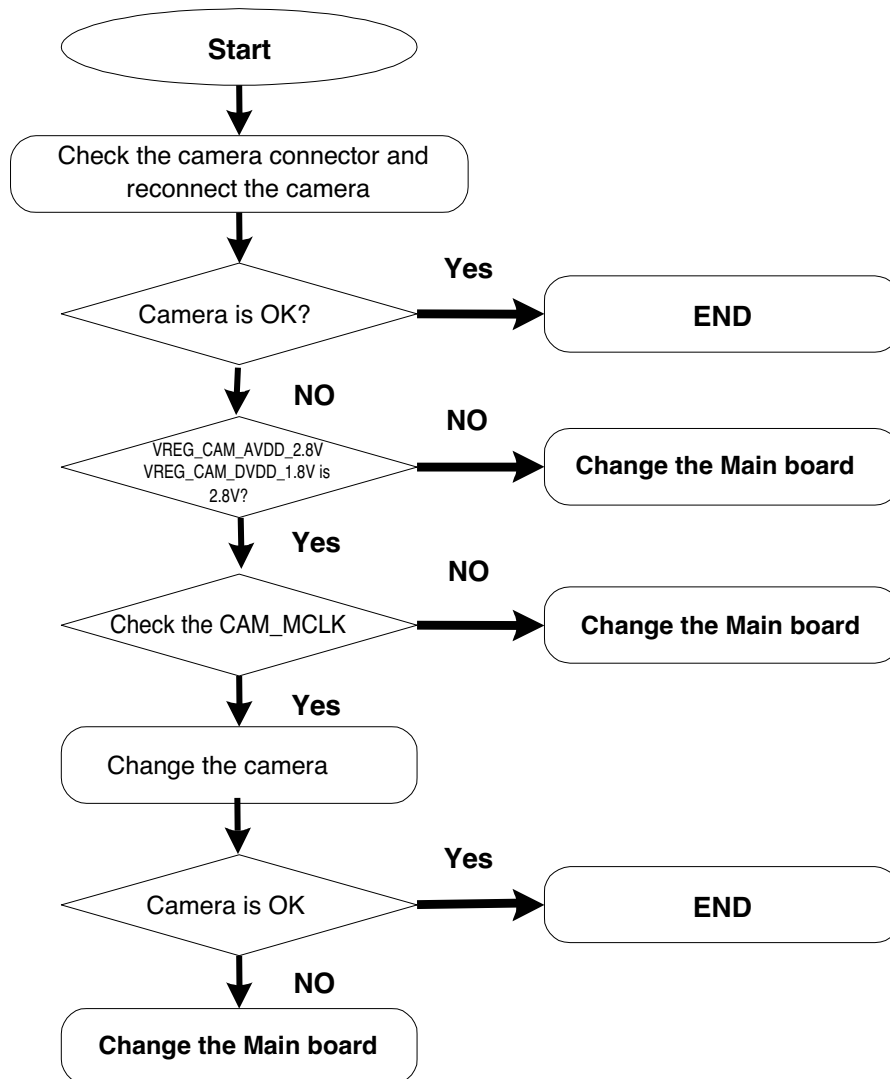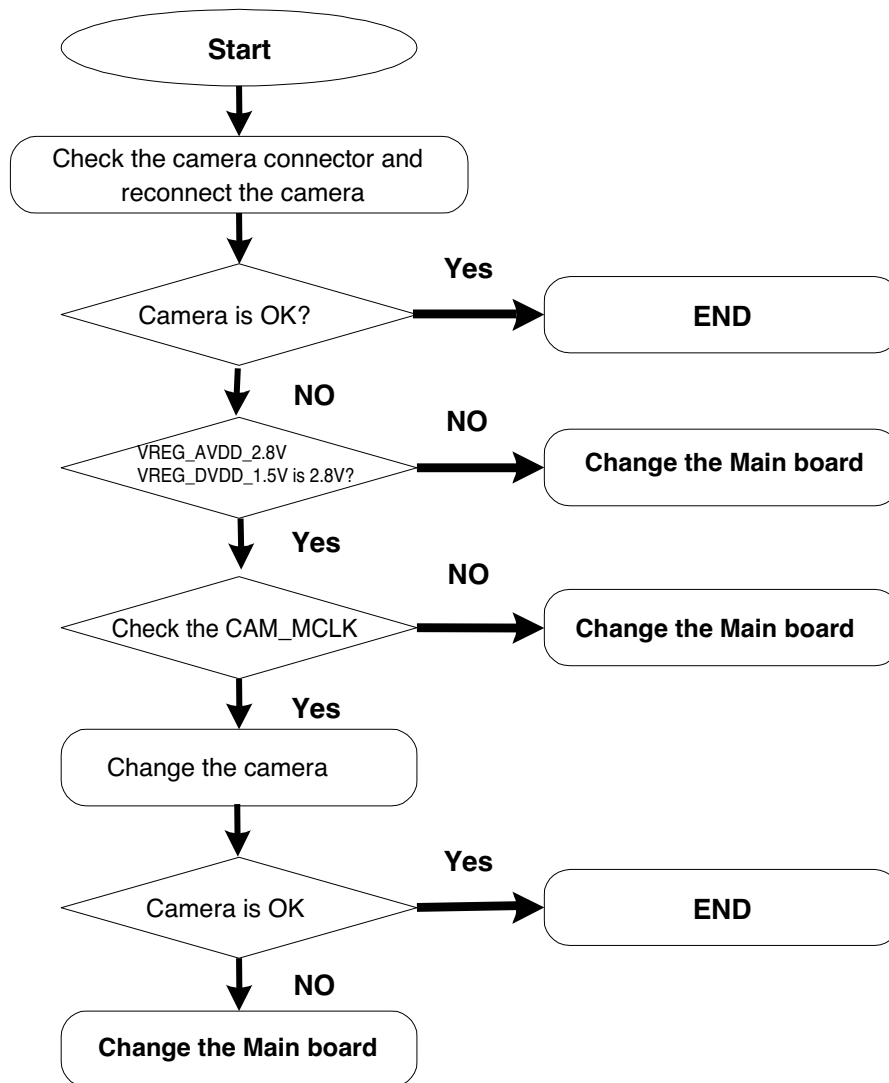
## 4.13.2 VGA CAMERA

```
                    ( Start )
                        |
                        v
        +-------------------------------+
        | Check the camera connector and |
        |     reconnect the camera       |
        +-------------------------------+
                        |
                        v                Yes
                < Camera is OK? >  ----------->  [ END ]
                        |
                        | NO
                        v                         NO
        < VREG_AVDD_2.8V              >  ----------->  [ Change the Main board ]
        < VREG_DVDD_1.5V is 2.8V?     >
                        |
                        | Yes
                        v                         NO
        < Check the CAM_MCLK >  ----------->  [ Change the Main board ]
                        |
                        | Yes
                        v
        +-----------------------+
        |   Change the camera   |
        +-----------------------+
                        |
                        v                Yes
                < Camera is OK >  ----------->  [ END ]
                        |
                        | NO
                        v
        [ Change the Main board ]
```
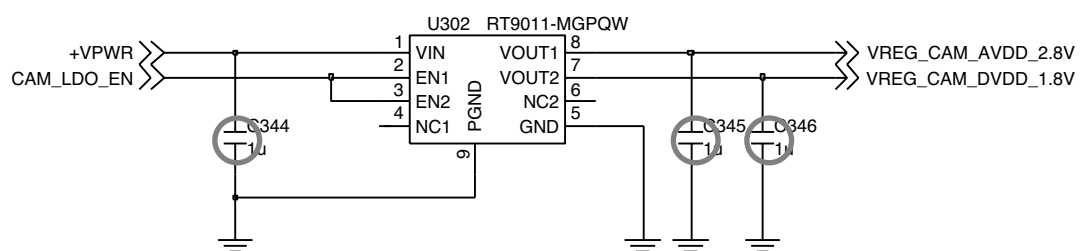
# 4. TROUBLE SHOOTING



## CAMERA LDO

## 4.14 Keypad Backlight Troubleshooting

Key Pad Back Light is on as below :

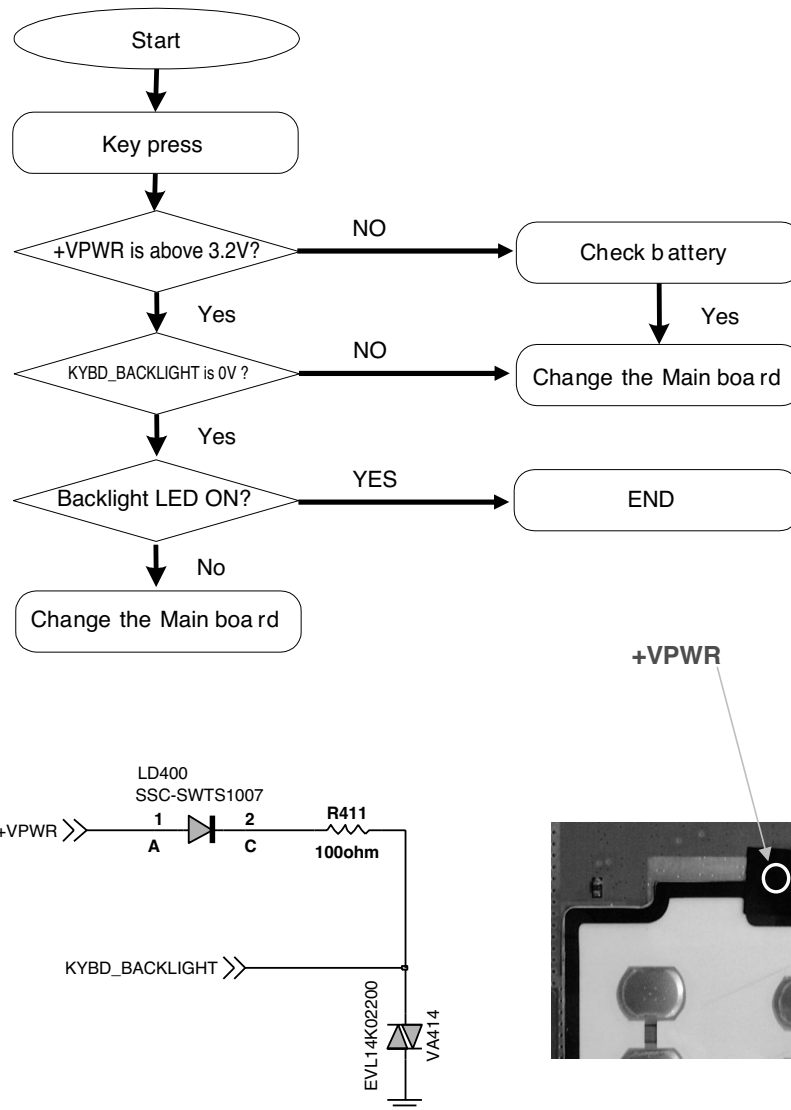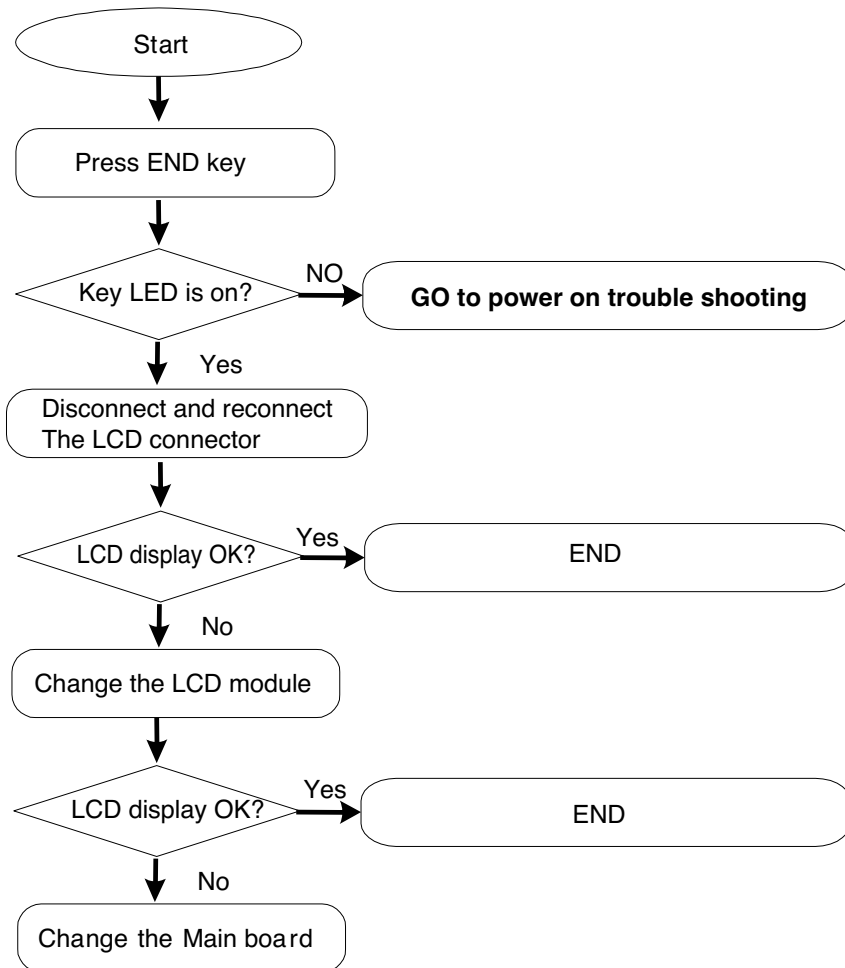Key pressing → KYBD_BACKLIGHT go to 0V → MAIN Key Backlight LED On

```
        ┌─────────────────┐
        │      Start       │
        └─────────────────┘
                 │
        ┌─────────────────┐
        │    Key press     │
        └─────────────────┘
                 │
        ╱─────────────────╲      NO      ┌─────────────────┐
       ⟨ +VPWR is above 3.2V? ⟩─────────▶│  Check battery   │
        ╲─────────────────╱              └─────────────────┘
                 │ Yes                            │ Yes
        ╱─────────────────╲      NO      ┌─────────────────────┐
       ⟨ KYBD_BACKLIGHT is 0V ? ⟩───────▶│ Change the Main board│
        ╲─────────────────╱              └─────────────────────┘
                 │ Yes
        ╱─────────────────╲      YES     ┌─────────────────┐
       ⟨  Backlight LED ON?  ⟩──────────▶│       END        │
        ╲─────────────────╱              └─────────────────┘
                 │ No
        ┌─────────────────────┐
        │ Change the Main board│
        └─────────────────────┘
```

**+VPWR**



**Figure.Keypad backlight LED part**

## 4.15 Main LCD Troubleshooting

Main LCD control signals are generated by MSM6245. The signal path is :
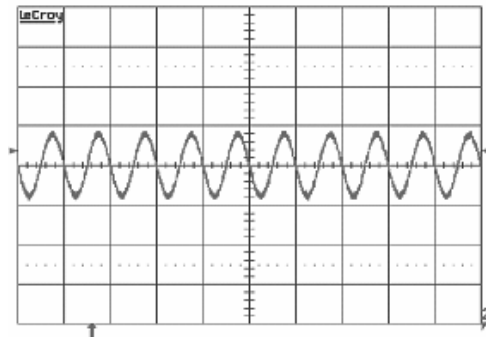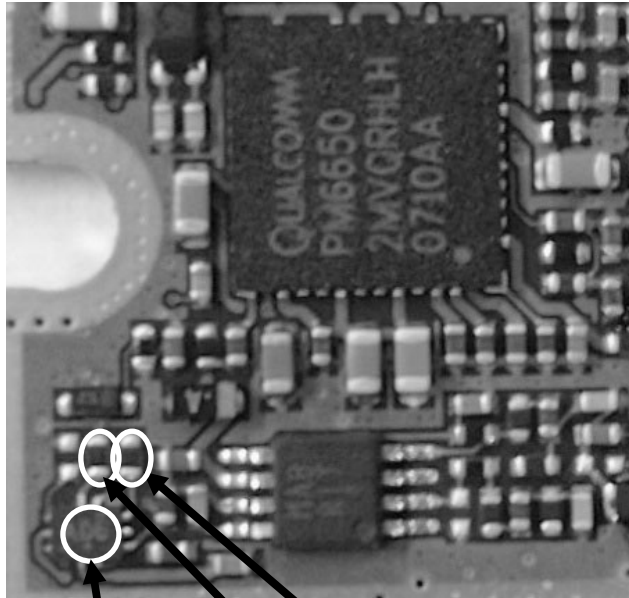MSM6245 → CN402 → LCD Module

```
                    ┌──────────────┐
                    (    Start     )
                    └──────┬───────┘
                           ▼
                  ┌────────────────┐
                  │ Press END key  │
                  └────────┬───────┘
                           ▼
              ◇                      NO    ┌────────────────────────────────┐
         Key LED is on?  ──────────────────▶│ GO to power on trouble shooting│
              ◇                             └────────────────────────────────┘
                │ Yes
                ▼
      ┌──────────────────────┐
      │ Disconnect and reconnect│
      │ The LCD connector    │
      └──────────┬───────────┘
                 ▼
          ◇              Yes    ┌──────────────┐
      LCD display OK?  ──────────▶│     END      │
          ◇                      └──────────────┘
             │ No
             ▼
   ┌────────────────────┐
   │ Change the LCD module│
   └──────────┬─────────┘
              ▼
       ◇              Yes    ┌──────────────┐
   LCD display OK?  ──────────▶│     END      │
       ◇                      └──────────────┘
          │ No
          ▼
 ┌────────────────────┐
 │ Change the Main board│
 └────────────────────┘
```

## 4.16 Receiver Path

MSM6245 EAR1ON/EAR1OP → R413, R414 → Analog Switch(U401)  Receiver

```
                        Start

        Connect the phone to network
        Equipment and setup call
        Setup 1KHz tone out

        Can you hear the tone?  --YES-->  END
                |
               NO
                |
        The sine wave appears at  --YES-->  Change receiver
        L101, L102?
                |
               NO
                |
        The sine wave appears at  --YES-->  Check the analog switch
        R413, R414?
                |
               NO
                |
        Change the Main board
```

**R414**

**R413**

**U401**

SELECT_SPK&RCV

U401
NLAS5223BMNR2G

+VPWR

C415
0.01u

| | | |
|---|---|---|
| | 1 VCC | NO2 10 |
| SPK- | 2 NO1 | COM2 9 |
| SPK_RCV- | 3 COM1 | IN2 8 |
| | 4 IN1 | NC2 7 |
| RCV- | 5 NC1 | GND 6 |

SPK+

SPK_RCV+

RCV_EN_N

RCV+

R414  39

R413  39

EVL14K02200

VA415

EVL14K02200

VA415

R415
NA

REV_B

## 4.17 Headset path

MSM6245 HPH_R, HPH_L → C402/C401 → R407/R406 → CN400 (MMI Connector)

```
         ┌──────────┐
         │  Start   │
         └────┬─────┘
              ▼
   ┌─────────────────────────┐
   │ Connect the phone to    │
   │ network equipment and   │
   │ setup call.             │
   │ Setup 1KHz tone out     │
   │ and insert headset.     │
   └───────────┬─────────────┘
               ▼
         ◇ Can you hear ◇──YES──▶ END
           the tone?
               │ NO
               ▼
      ◇ Sine wave appears ◇──YES──▶ Change the Headset
        at R407/R406?
               │ NO
               ▼
      Change the Main board
```

# 4. TROUBLE SHOOTING

**CN400**

**R406**

**C401**

**R407**

**C402**

R403
51K

CN400
HSEJ-18S04-25R

C401 + 33u    R406 100ohm
C402 + 33u    R407 100ohm

FL405    REV_B
2    OUT    IN    1
4    G2    G1    3
NTS104B

21
19
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
20
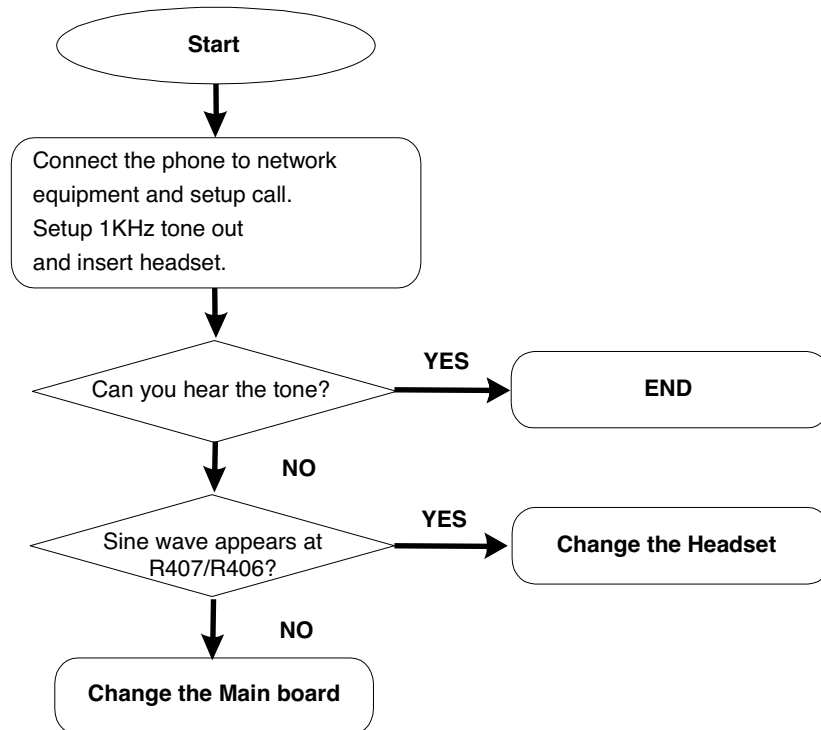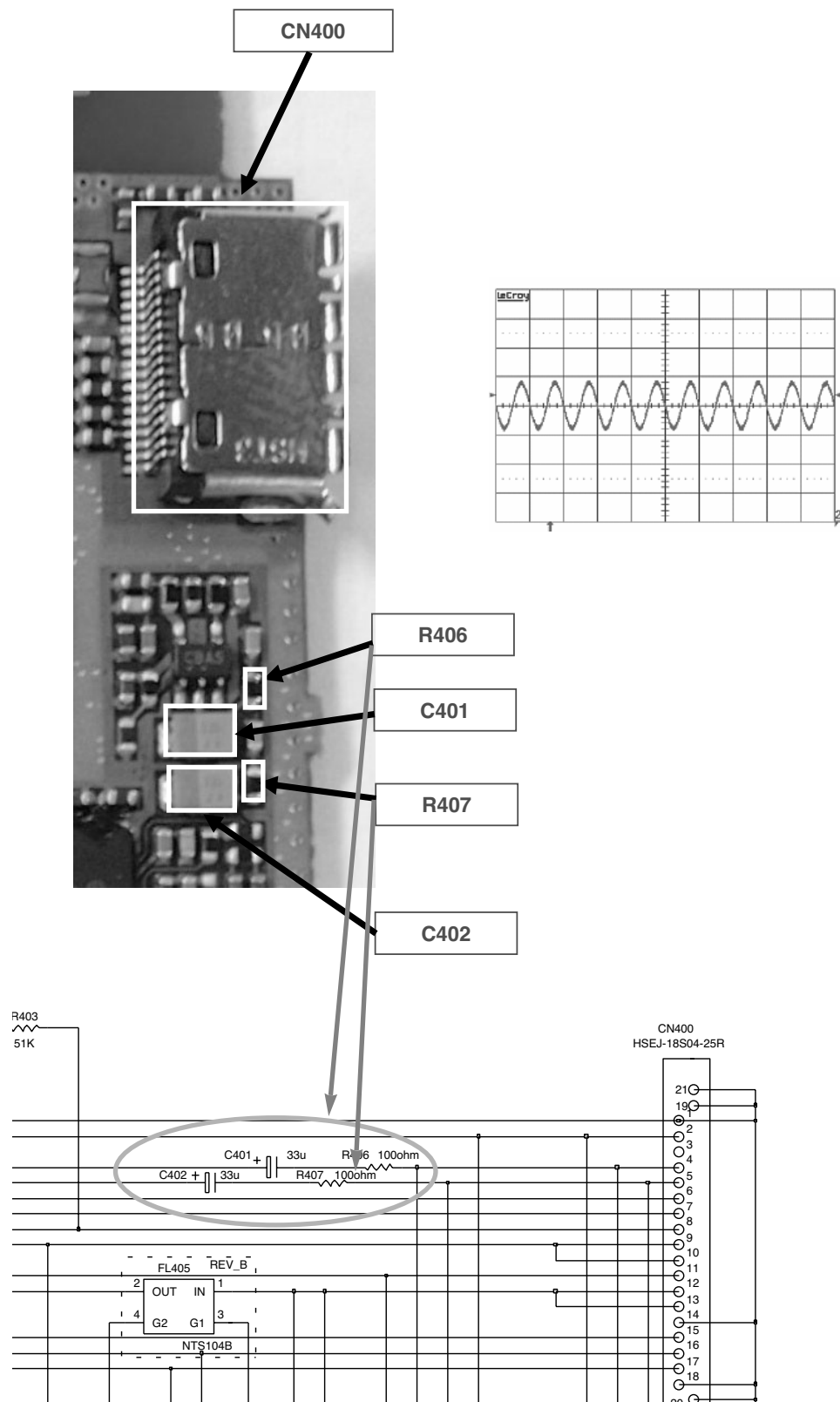
## 4.18 Speaker phone path

MSM6245 LINE_P,LINE_N → R418/R420, C427/C428, R419/R421 → Audio AMP(U402)
→ Analog Switch(U401) → Speaker

```
                          Start
                            |
                            v
              +-------------------------------+
              | Connect the phone to network  |
              | equipment and setup call      |
              | Setup 1KHz tone out           |
              +-------------------------------+
                            |
                            v
                 < Can you hear the tone? >  --YES-->  [ END ]
                            |
                           NO
                            v
          < Sine wave appears at
            R418/R420 and C427/C428    >  --NO-->  [ Change the Main board ]
            And R419/R421 ?
                            |
                          YES
                            v
                 < SPK_AMP_EN is 2.6V? >  --NO-->  [ Change the Main board ]
                            |
                          YES
                            v
          < The sine wave appears at
            SPK+, SPK- ?            >  --NO-->  [ Change the Audio Amp ]
                            |
                          YES
                            v
          < The sine wave appears at
            SPK_RCV-,SPK_RCV+?     >  --YES-->  [ Change speaker ]
                            |
                           NO
                            v
              [ Change the Main board ]
```

**R421**

**C428**

**R420**

**R418**

**SPK_AMP_EN**

**Analog Switch**    **Audio Amp**    **R419**    **C427**

**Speaker**

## SELECT_SPK&RCV



## VIBRATOR PAD



**SPK_AMP_EN : 2.6V**

## Audio AMP

## 4.19 Main microphone

MIC400 → MIC1P, MIC1N (MSM6245)

```
                    ┌──────────────────┐
                    │      Start       │
                    └──────────────────┘
                             │
                             ▼
                    ┌──────────────────┐
                    │   Make a call    │
                    └──────────────────┘
                             │
                             ▼
                    ◇ MIC_BIAS(C421) ◇    NO    ┌──────────────────────┐
                    ◇   is 1.8V      ◇ ────────▶│  Change main board   │
                             │                   └──────────────────────┘
                          YES│
                             ▼
                    ┌──────────────────┐
                    │ Make sound to MIC│
                    └──────────────────┘
                             │
                             ▼
                    ◇ Sine wave appears at ◇  NO   ┌──────────────────┐
                    ◇   C423/C424?         ◇ ─────▶│  Change the MIC  │
                             │                      └──────────────────┘
                          YES│                               │
                             ▼                               ▼
          ┌──────────────────────┐   NO   ◇ Work well? ◇  YES  ┌──────────┐
          │ Change the Main board│◀───────◇            ◇ ──────▶│   END    │
          └──────────────────────┘        └─────────────┘       └──────────┘
```
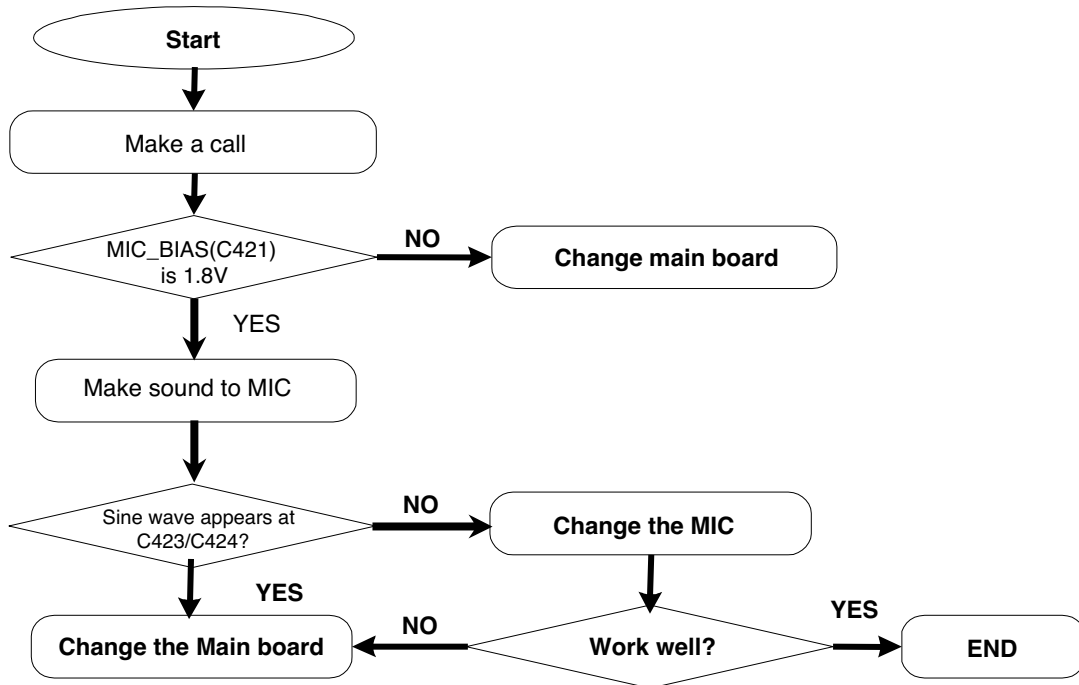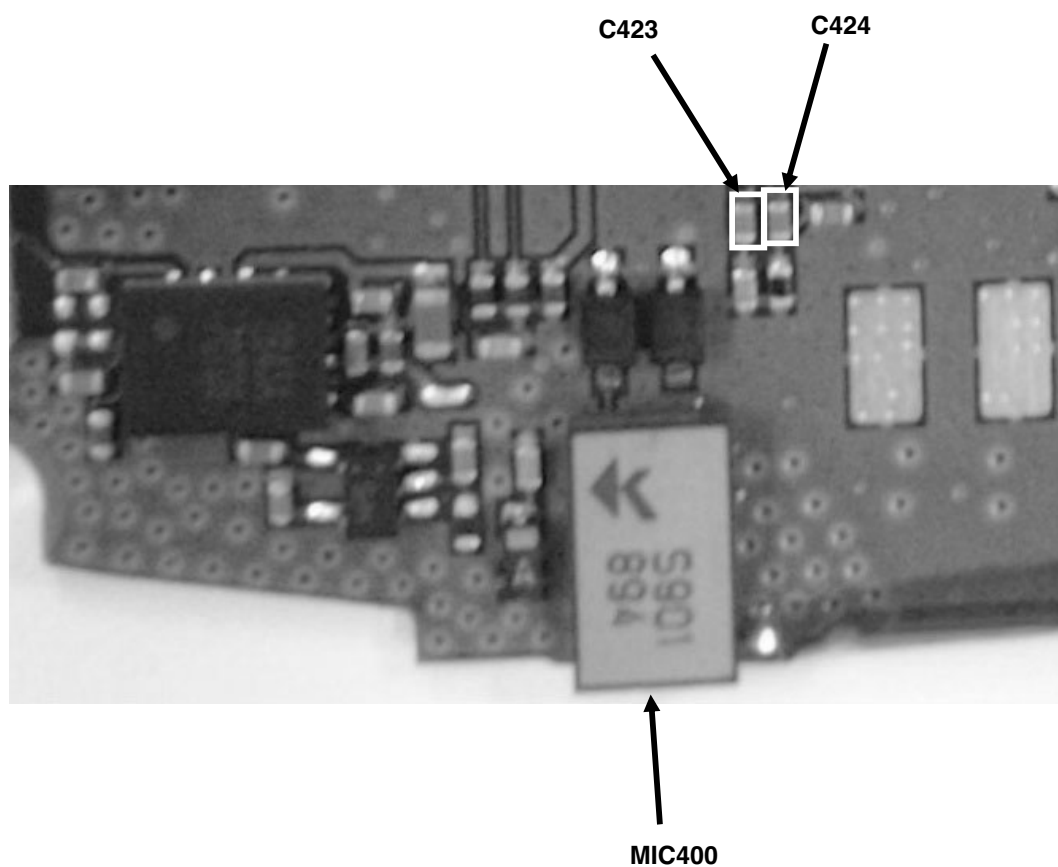
## 4.20 Headset microphone

Headset → C210/C211 → MIC2P, MIC2N (MSM6245)

Ear_Sense_N

C211

C210
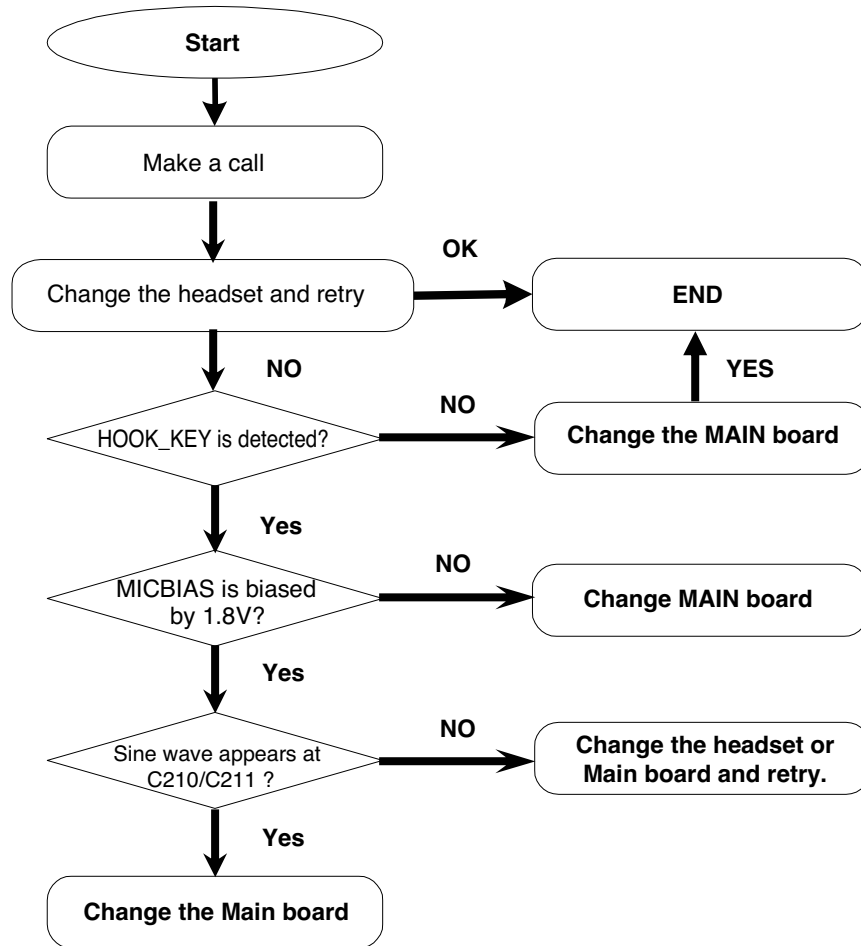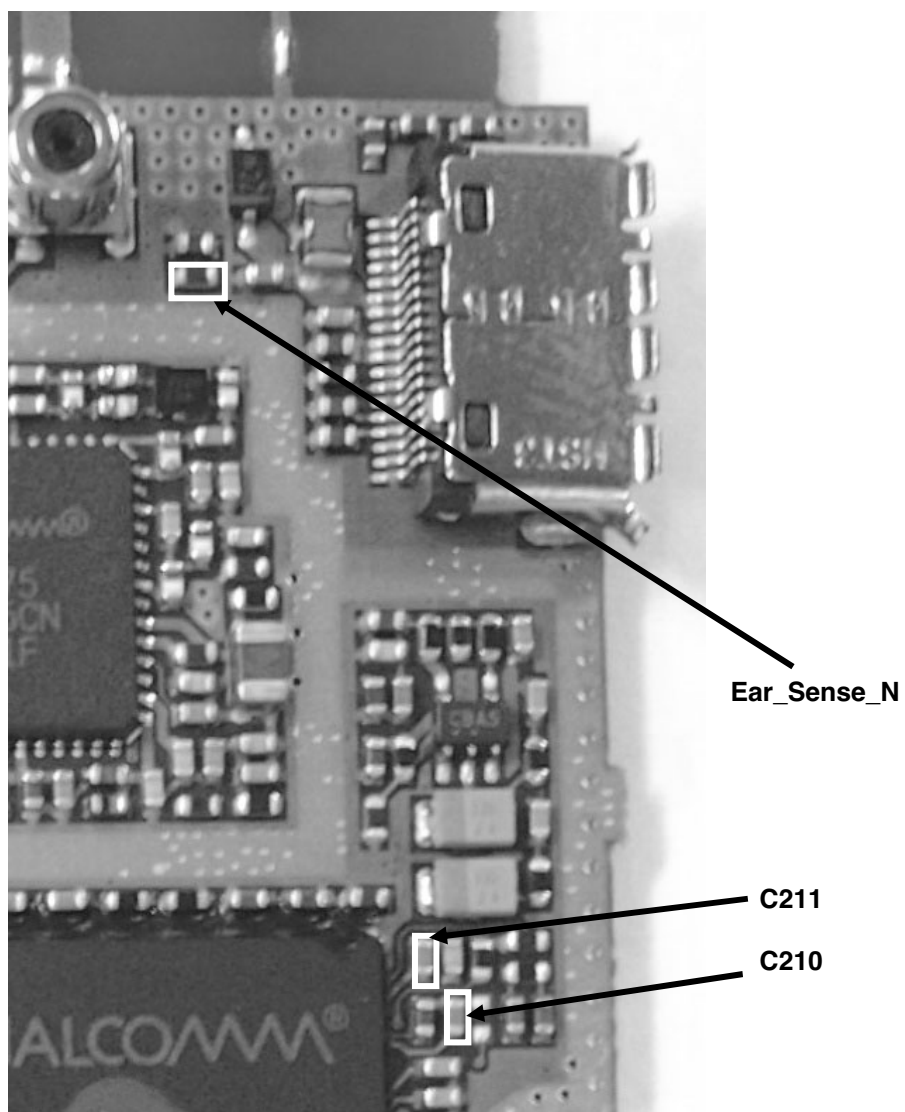
## 4.21 Vibrator

The Vibrator is connected between +VPWR and VIB_DRV_N (PM6650 25 pin).
The Vibrator motor driver is an SBI-programmable voltage out that is reference to +VPWR.
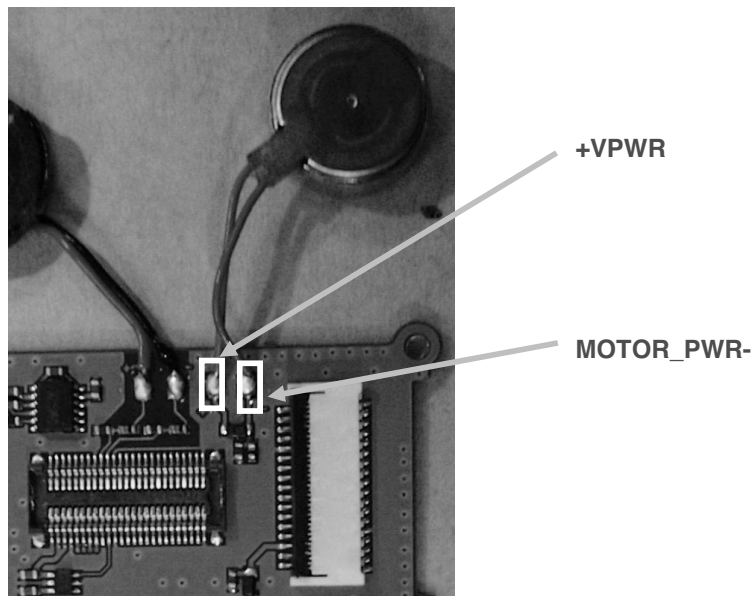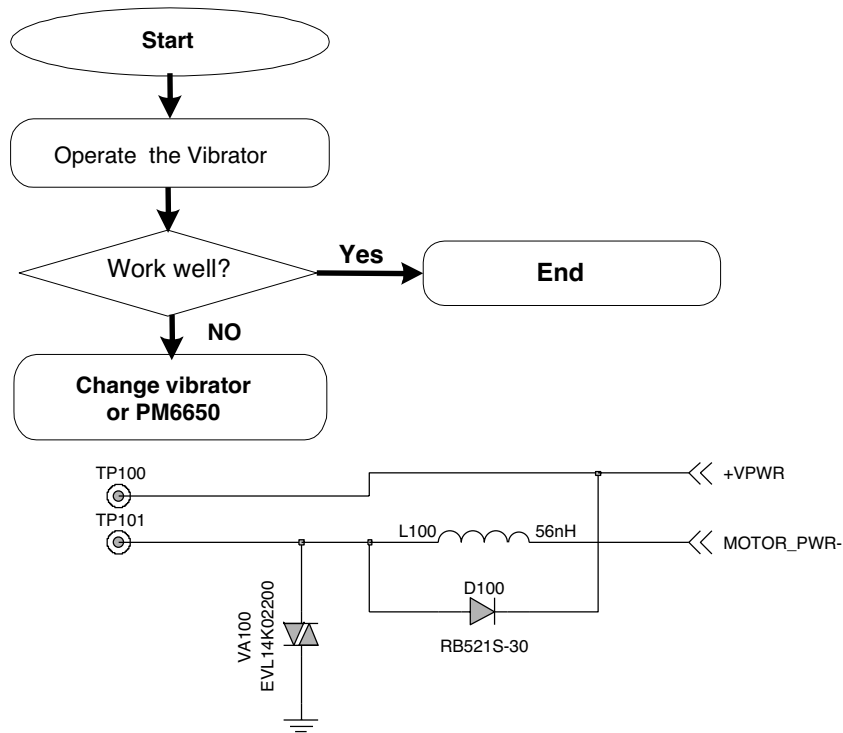
# 5. DOWNLOAD

## 5.1 Introduction

LGMDP is a LGE application that allow users to download images from PC to handset. LGMDP is a download tool with capabilities to upload image files to the handset. LGMDP is designed to be simple to use and easy enough for the beginner to upload executable images to the handset. LGMDP supports Windows 2000/XP where the LG (Ver 4.6 or later) USB modem driver is installed. Additionally, LGMDP allows multi downloading up to 9 handsets at the same time.

## 5.2 Downloading Procedure

・Connect the phone to your desktop PC using the USB cable and run the LGMDP application. Before getting started, set up LGMDP preferences from the Preferences of the file menu the way you want. Click on the File menu and select Preferences.
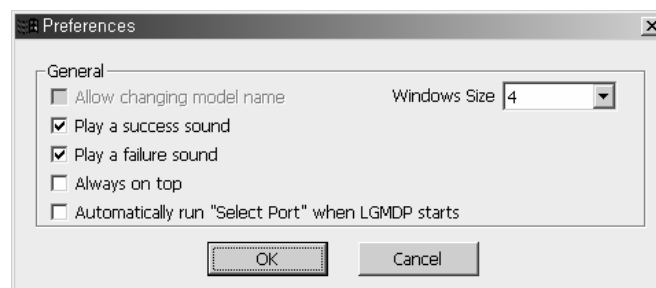
➢ **Play a success sound**
It will be played a .wav file when the download has been completed. To enable this simply check the box.

➢ **Always on Top**
Check if LGMDP always appears at the top of the window so that user can monitor it all the time.

➢ **Automatically run Select Port When LGMDP starts**
When LGMDP starts, it will automatically select Select Port button to download new image file.

## 5.2.1 Connecting to PC

· Click on the Select Port and then Select Port window will be pop up. Check if state shows Enable for the port to be connected for downloading images. Then click on the Connect button.
 (The port number(COM7) shall be different from that of the port number in the snapshot.)
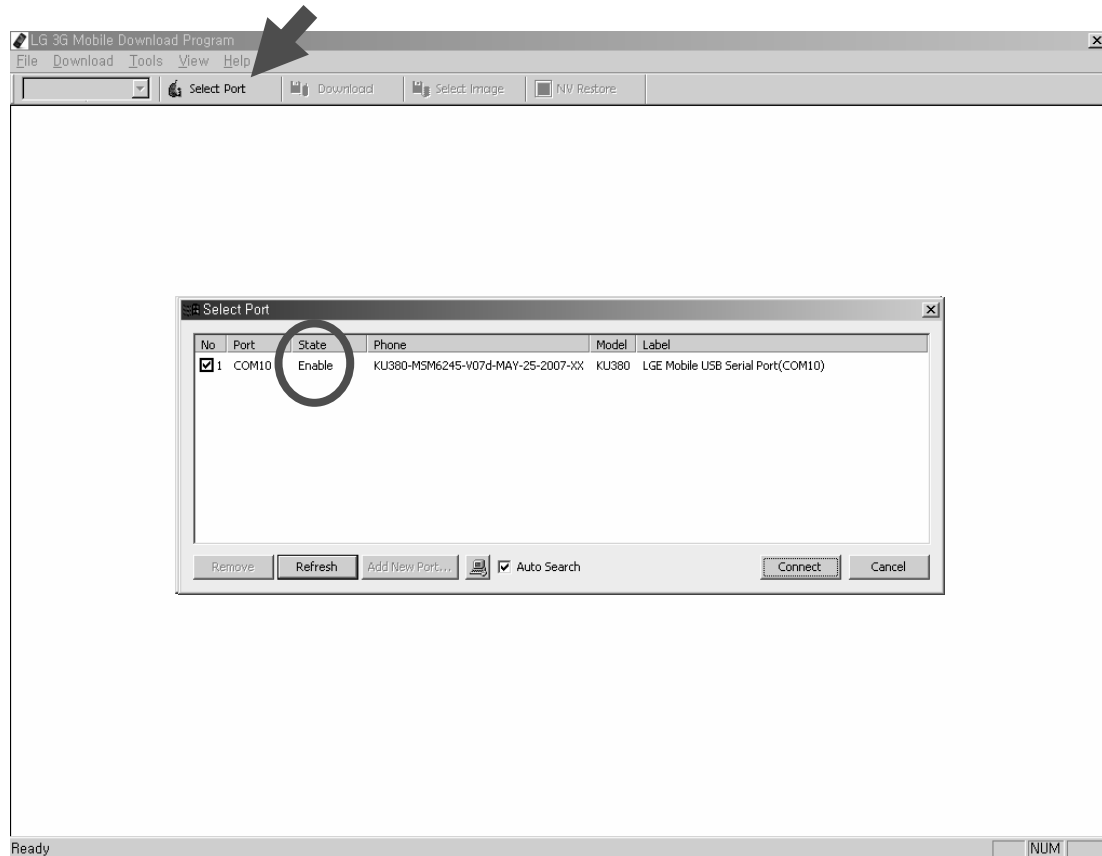
# 5. DOWNLOAD

· The status Ready is displayed when the application is ready for downloading. While the images are transmitted from PC to the handset, a progressive bar (Red box) indicating the degree of transmission of data is displayed.
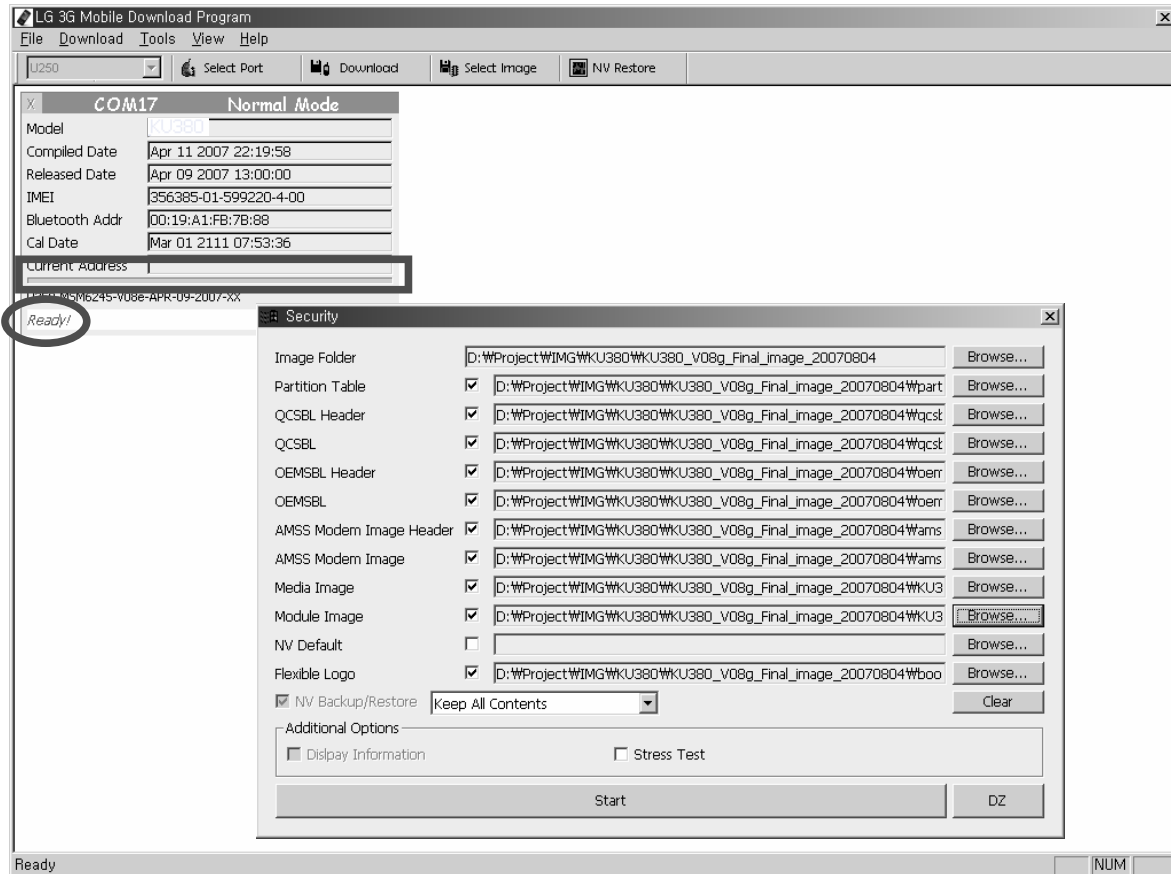
1) Image Folder indicates loot path where all image files are placed. To change location of the default image path, select Browse… button. The edit box shows the file path where images are located. Please note that all images should be located in a selected folder.

2) Click on the Browse… button to select image files to be downloaded on the handset.

3) NV Backup/Restore: NV Backup/Restore always have to be done, and it is default selected option. Backup the NV data and restore the backed up NV data automatically.

# 5. DOWNLOAD

**4) Reset database & Contents:**

User related data including the setting data on the EFS is reset in the handset. The user contents in the handset will be erased. If you want to reset all the user data back to the way they were before you started downloading new images, check the option.

**Erase_EFS:**

The calibration data, user contents, media, and module are erased. Only calibration data is kept when NV backup/restore is checked. The user contents and file system physically are wiped out.

**Keep All Contents**

Maintain user data including WAP, AD, DRM, E-mail, Play lists, and images when downloading a new S/W images. User data stated above are maintained if this option is selected.

**5) Additional Options:**

Display Information is defaultly not selected and user cannot choose.
Override partition table is also also defaultly not selected and user cannot choose.

**6) Clear:** Clearing all directory paths of images in the dialog.

**7) Start:** Starting downloading the selected individual image.

## 5.2.2 Choosing image files

· Select the image folder, where all the image files are located, by clicking on the Browse….
(The folder name shall be different from that of the folder name in the snapshot. The folder name
indicates the path where the image files are located.)
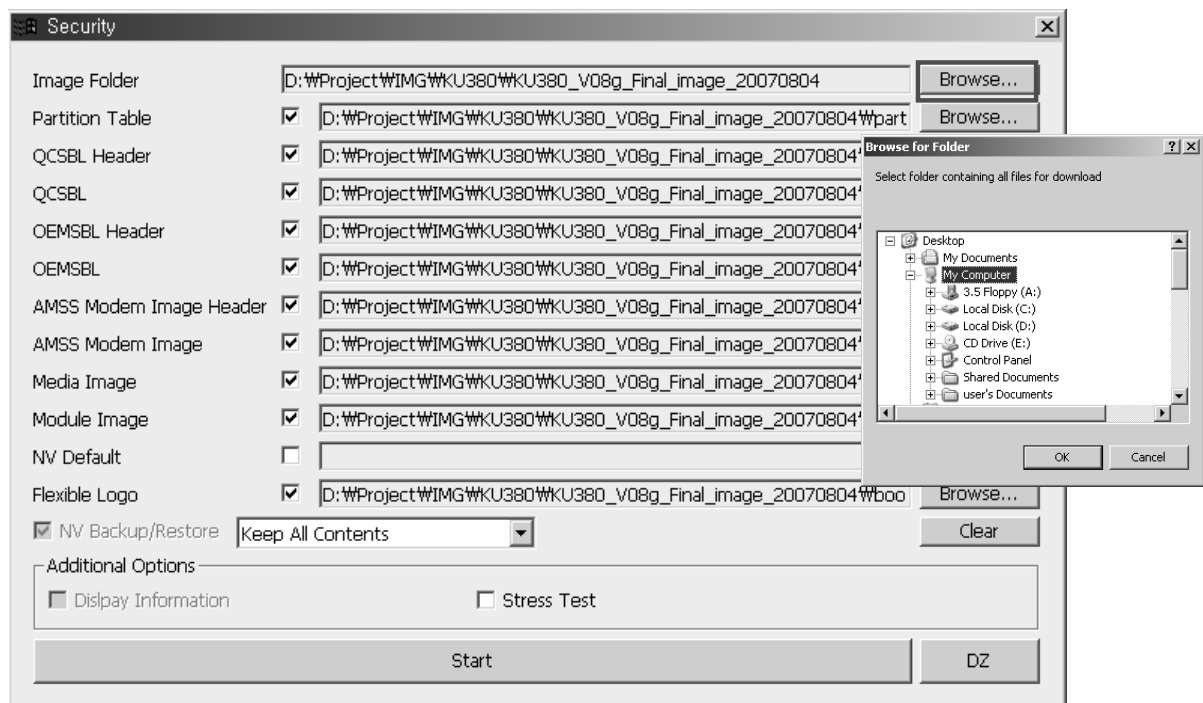
# 5. DOWNLOAD

Select the path on the Image Folder by clicking on the Browse…, then the LGMDP will automatically load images accordingly. Also you can select images by manually. For instance, select the path of AMSS Modem Image file by clicking on the Browse… button.

The selected AMSS image will be downloaded to the handset from the path directory in the PC. Make sure that you have chosen correct file. In case of wrong AMSS Modem file is selected, the phone may not work. (The file name shall be different from that of the file name in the snapshot.)
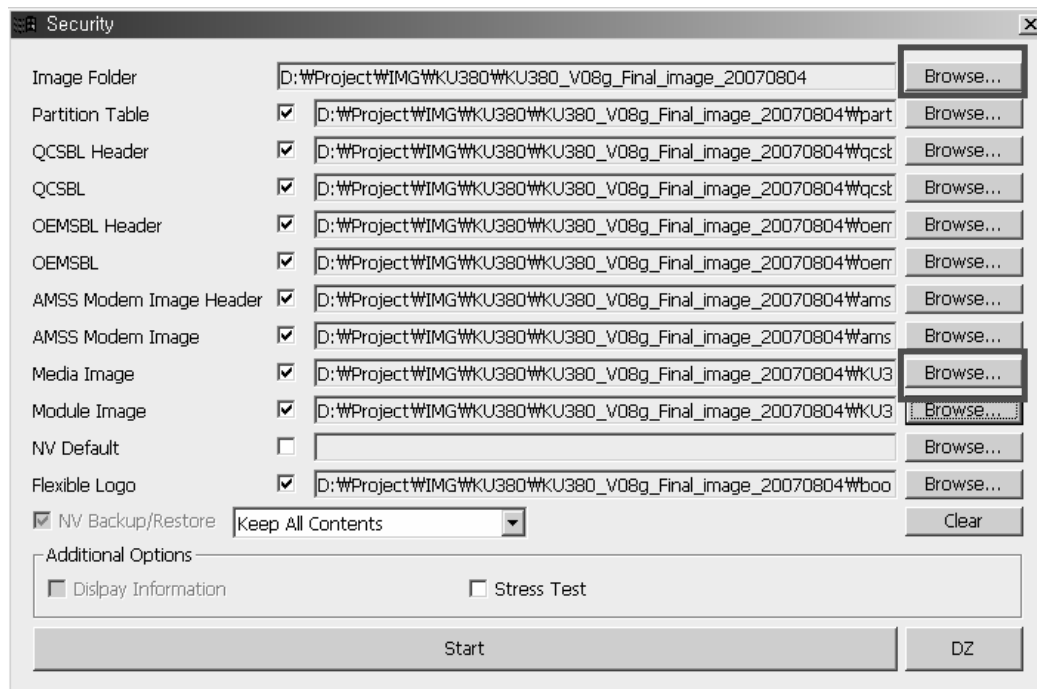
· If NV restore is failed, then the NV Data(*.nv2) is erased permanently. In this case, choose the desired NV file to be downloaded on the handset. To enable this simply check the box or select the NV file from the LGMDP installation directory by clicking on the Browse… button.
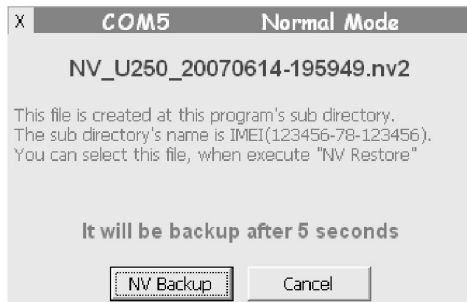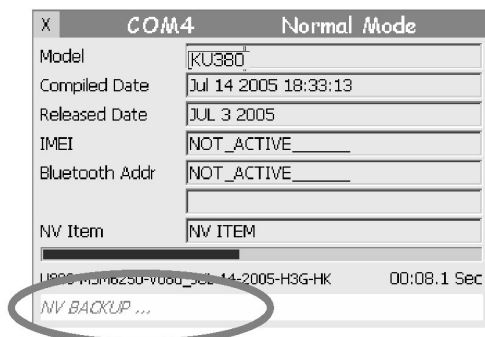
# 5. DOWNLOAD

Click on the START button to start downloading. A summary of the selected images and option information window will be displayed. Click on the No button if this is notthe setting you are downloading for. Otherwise click on the Yes button to continue downloading selected image file with options.

## 5.2.3 Downloading

**COM5    Normal Mode**

NV_U250_20070614-195949.nv2

This file is created at this program's sub directory.
The sub directory's name is IMEI(123456-78-123456).
You can select this file, when execute "NV Restore"

It will be backup after 5 seconds

[ NV Backup ]    [ Cancel ]
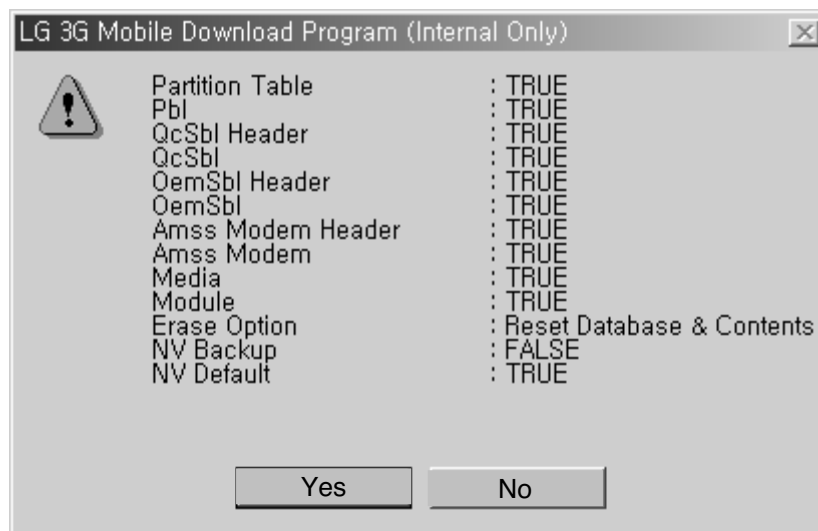
- This message box informs that a new file for NV backup will be created in the displayed file name in the LGMDP installation directory.

**COM4    Normal Mode**

| | |
|---|---|
| Model | KU380 |
| Compiled Date | Jul 14 2005 18:33:13 |
| Released Date | JUL 3 2005 |
| IMEI | NOT_ACTIVE_____ |
| Bluetooth Addr | NOT_ACTIVE_____ |
| NV Item | NV ITEM |

U880-MSM6250-V060_JUL-14-2005-H3G-HK    00:08.1 Sec

*NV BACKUP ...*

- Backing up NV data and backed up NV data will be stored in the LGMDP installation directory.

**COM4    Normal Mode**

| | |
|---|---|
| Model | KU380 |
| Compiled Date | Jul 14 2005 18:33:13 |
| Released Date | JUL 3 2005 |
| IMEI | NOT_ACTIVE_____ |
| Name | Btsearch.pxo |
| Type | File |
| Size | 21,550 |

U880-MSM6250-V060_JUL-14-2005-H3G-HK    00:08.6 Sec
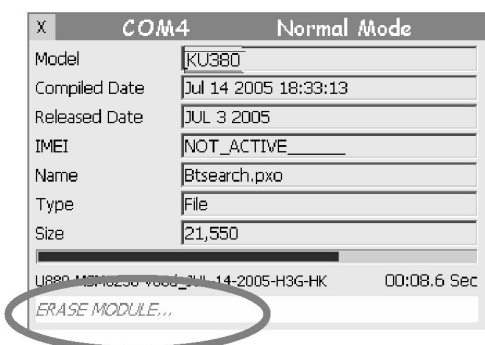
*ERASE MODULE...*

- Erasing the existing directories and files before the Module image is downloaded.

**COM4    Normal Mode**

| | |
|---|---|
| Model | KU380 |
| Compiled Date | Jul 14 2005 18:33:13 |
| Released Date | JUL 3 2005 |
| IMEI | NOT_ACTIVE_____ |
| Start Address | 0x00030000 |
| Stop Address | 0x017568E8 |
| Current Address | 0x0010E000 |

U880-MSM6250-V060_JUL-14-2005-H3G-HK    00:23.8 Sec

*AMSS MODEM BURNING ...*
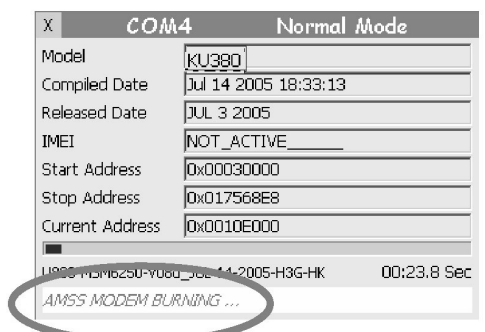
- Downloading the AMSS modem image

# 5. DOWNLOAD



• Rebooting the handset and re-establishing the connection
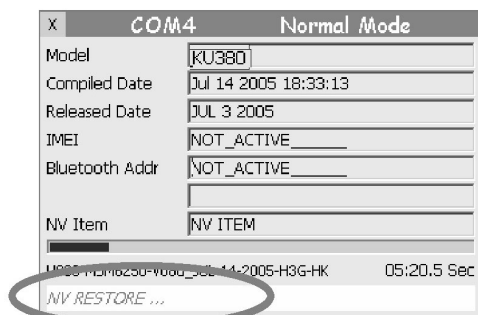


• Restoring NV data which backed up in the Backing up process. User can also restore NV data using NV Default image selection.



• Rebooting the handset and re-establishing the connection
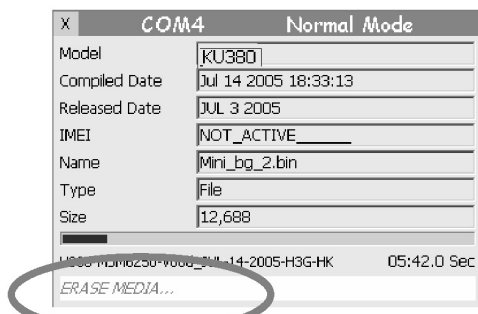


• Erasing the existing directories and files before downloading the selected Media image

• Downloading Media image in progress



• Downloading Module image in progress



• Downloading process has completed
  successfully

# 5. DOWNLOAD

## 5.2.4 Tools

· Device Manager allows to monitor current hardware that is installed on your PC. Device Manager is designed to monitor USB connectivity and check where the COM has been installed . Select Device Manager from the Tools of the file menu.
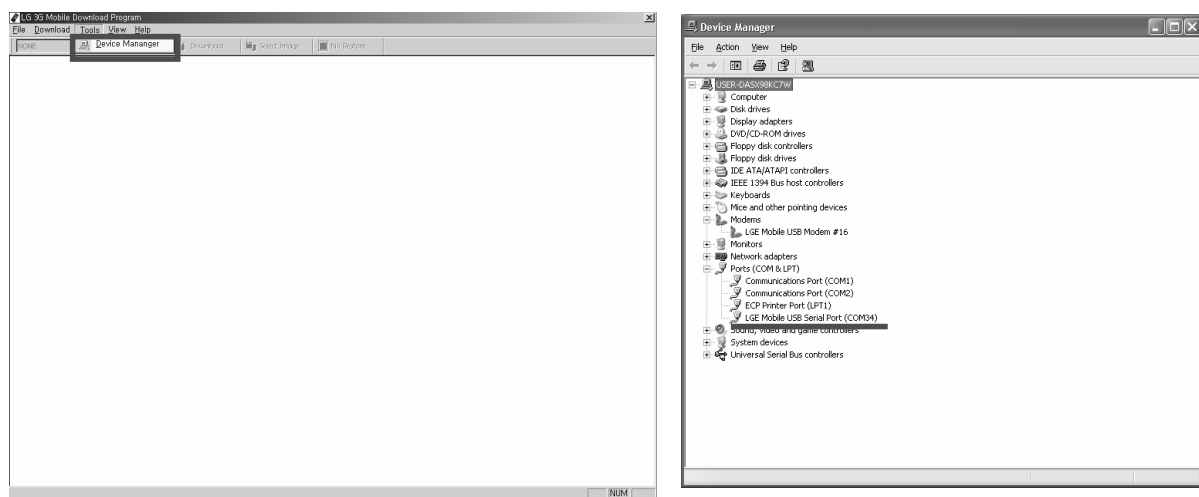
# 5.3 Troubleshooting Download Errors

## 5.3.1 When the phone does not work

· Reboot the phone in the emergency mode (Simultaneously press 2, 5, and PWR red keys) and then try to download all the images up to AMSS. In the emergency mode, you can not download media or module image.

· The phone supports a special mode called emergency mode. In this mode, minimum units for downloading is running so that users can download the images again in case of emergency situation. (AMSS modem, Media, and Module images can not be running in this mode.)

· The below dialog shows parameters of Select Port when phone is booted in Emergency mode. Click on the Connect button to continue.
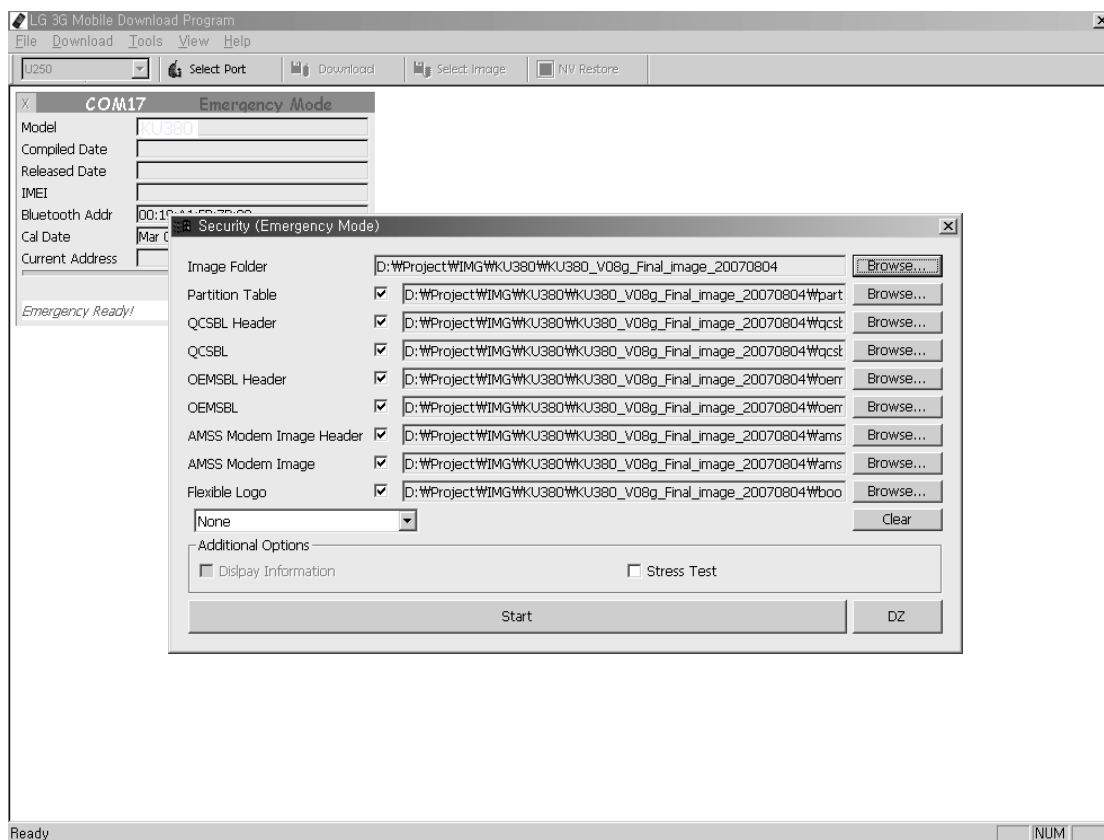
# 5. DOWNLOAD

· Choose Image file after clicking on the Browse… button. Make sure that you have chosen the right image file. After choosing valid images, then click on the Start button to start downloading selected images. The selected image will be downloaded to the handset from the path directory in the PC. After downloading images successfully, it will boot to normal mode.

## 5.3.2 NV Restore Error

· Snapshot showing the NV Restore error. Next slide shows the remedial procedure to adopt.
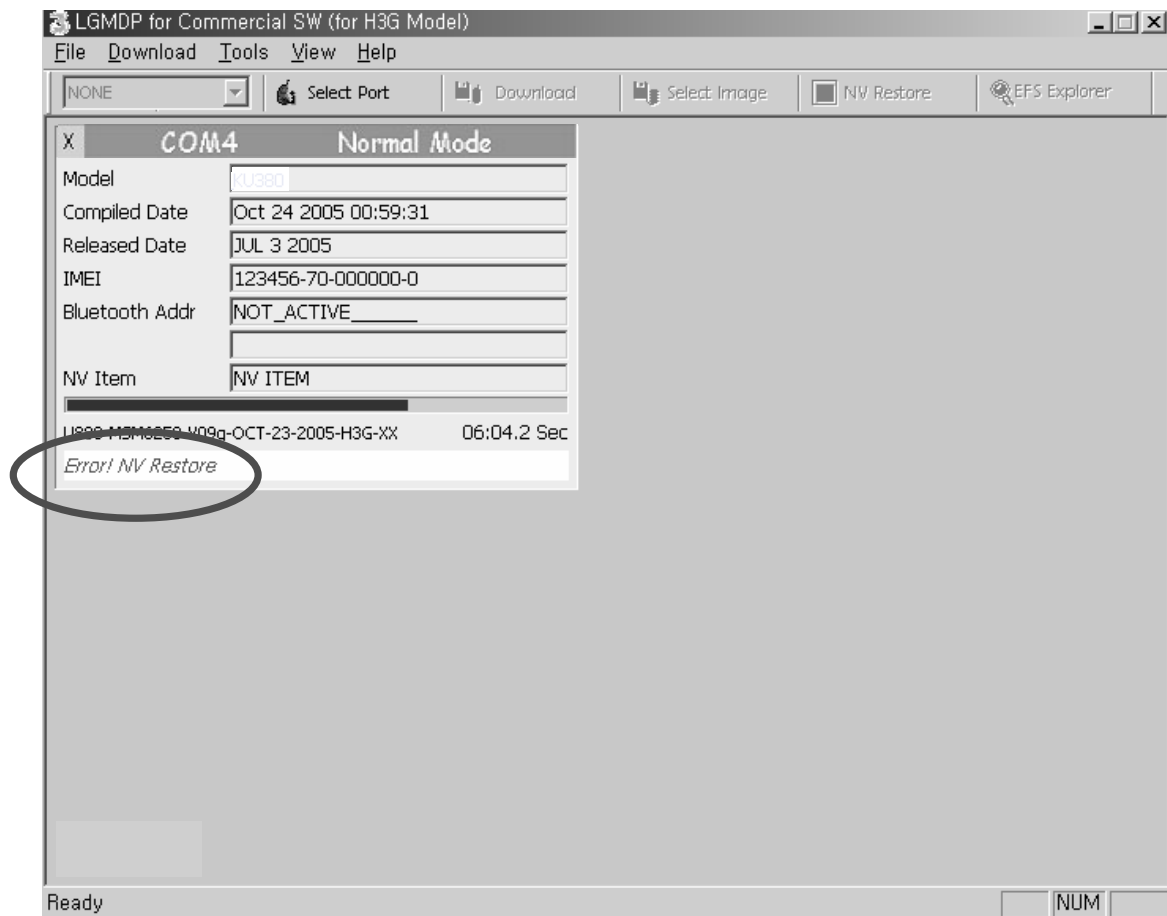
# 5. DOWNLOAD

・Connect the handset and Press the Connect button in the Select Port window.
(Enable state in the window indicates that the Phone has been detected and is ready to download.)
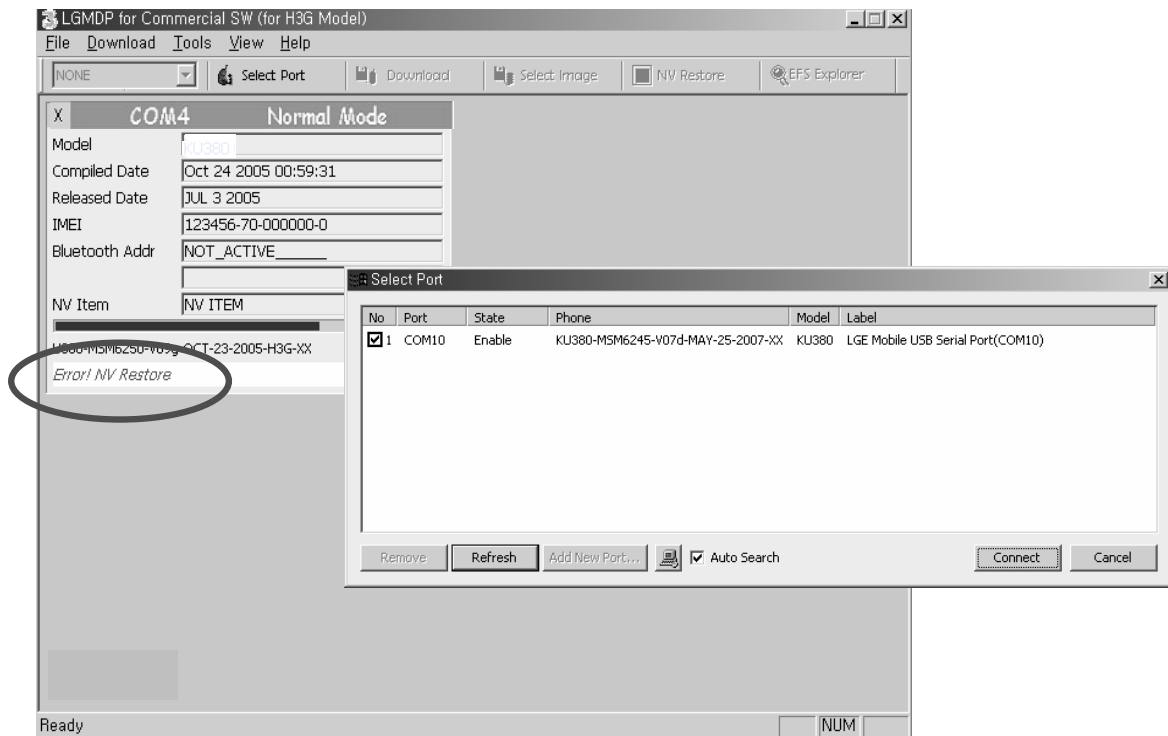
· Click on Browse… . Select the LGMDP installation directory and a list of NV Backup files(*.nv2) will be shown. These nv files were saved every time NV Backup option was selected, and the name of the nv file is determined based on the time when NV Backup was done. Choose the desired NV file to be downloaded on the handset, and click on Start.

## 5.4 Caution

1) Multi-downloading using the USB hub is not recommendable.
2) If you see the message 'cal mode' after 'completing download', you must do NV restore and image (media and module) download.
3) The NV data saved at LGMDP folder as following format.

D:\LGMDP\004400-01-429926\_COM14_

**LGMDP folder name**

**IMEI number**

**Port number**
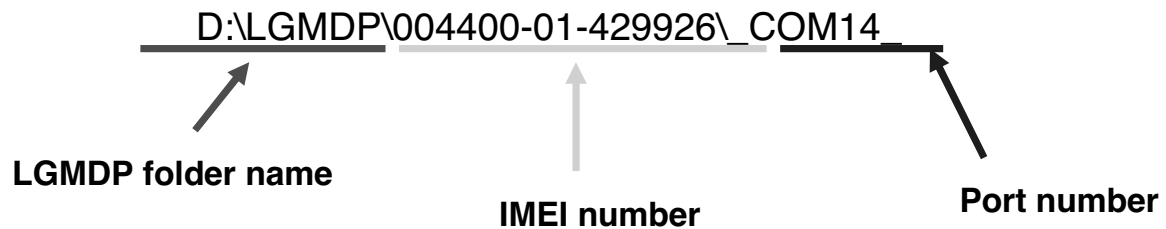
4) Recommended that the Module and Media Image have to be downloaded at the\ same time.
5) Erase EFS option will erase everything (media, module, nv items, and user data) in the EFS area.

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# 6. BLOCK DIAGRAM

## 6.1 GSM & UMTS RF Block
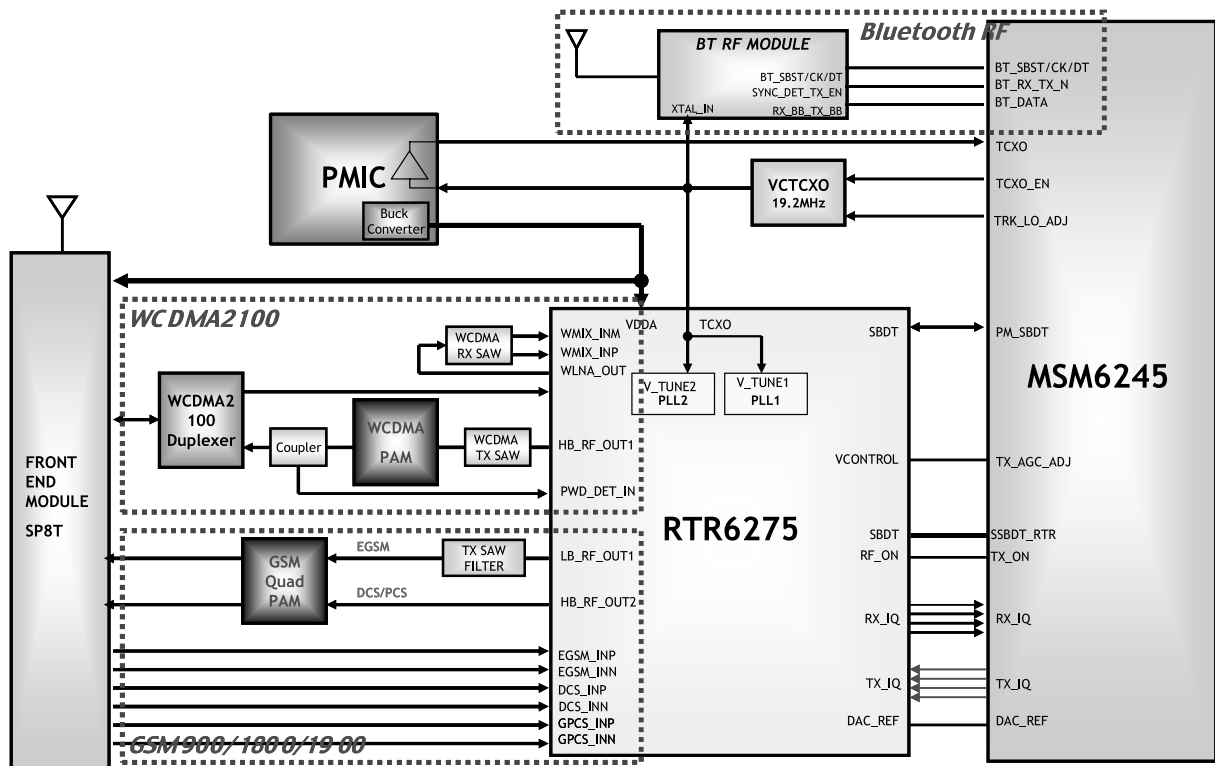


[Fig 2.1] KU380 RF Functional Block Diagram

# 6. BLOCK DIAGRAM

| Ref. Name | Part Name | Function | Comment |
|-----------|-----------|----------|---------|
| U101 | RTR6275 | UMTS/GSM Transceiver | TRX |
| U102 | SKY77329 | GSM TX Dual PAM | TX |
| U105 | TC7SH04FU | Bluetooth buffer | Bluetooth |
| U103 | CP0402A1950DNTR | UMTS2100 coupler | TX |
| U104 | AWT6277R | UMTS2100 PAM | TX |
| SW100 | KMS-507 | Test Connector | Calibration, etc |
| X100 | DSA321SCE-19.2M | VCTCXO | 19.2MHz |
| M100 | LBRQ-2B43A | Bluetooth RF Transceiver | Bluetooth TRX |
| U100 | D5011 | FEM (Front end Module) | FEM |
| FL100 | EFCH897MTDB1 | GSM900 TX SAW Filter | TX |
| FL101 | EFCH1950TDF1 | UMTS2100 TX SAW filter | TX |
| FL103 | EFCH2140TDE1 | UMTS2100 RX SAW flter | RX |
| FL102 | ACMD-7602 | UMTS2100 Duplexer | TRX |

**[Table 2.1] RF Block Component**

## 6.2 Interface Diagram

### 6.2.1 RTR6275 & MSM6245 Interface Diagram
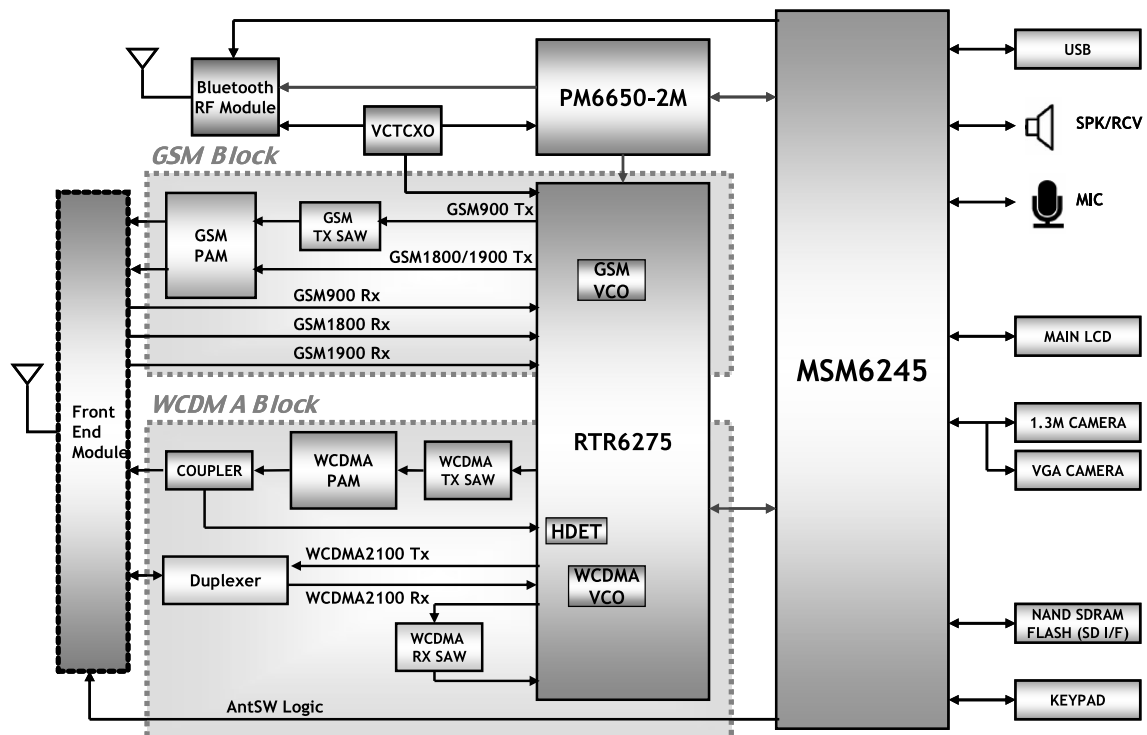


[Fig 2.2] RTR6275 & MSM6245 Interface Diagram

# 6. BLOCK DIAGRAM

## 6.2.2 Memory Interface



**EBI1**

ADDRESS[12:0]
DATA[31:0]
WE*
CS*
CAS*
RAS*
CLK_EN
CLK
DQM[3:0]

SDRAM
512Mb

MSM6245_A

**EBI2**

NAND_CS*
RESOUT*
WE*
NAND_CLE
OE*
NAND_ALE
NAND_READY
DATA[7:0]

NAND
512Mb
(64MB)

SIM_RESET
SIM_IO
SIM_CLK

USIM

PMIC
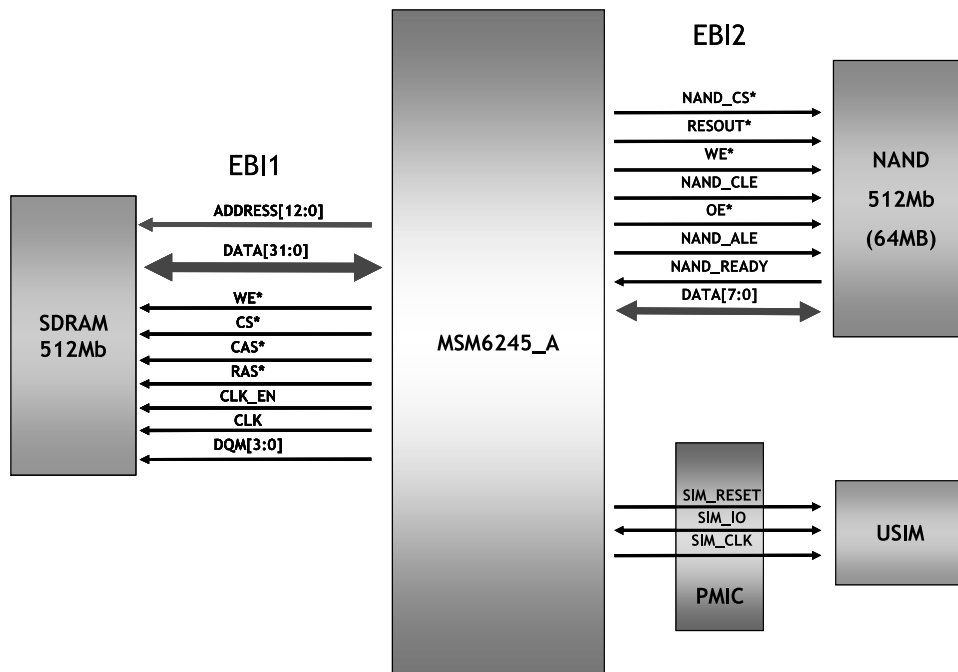
**[Fig 2.3] Memory Interface Diagram**

## 6.2.3 USB,UART,SIM,JTAG Interface
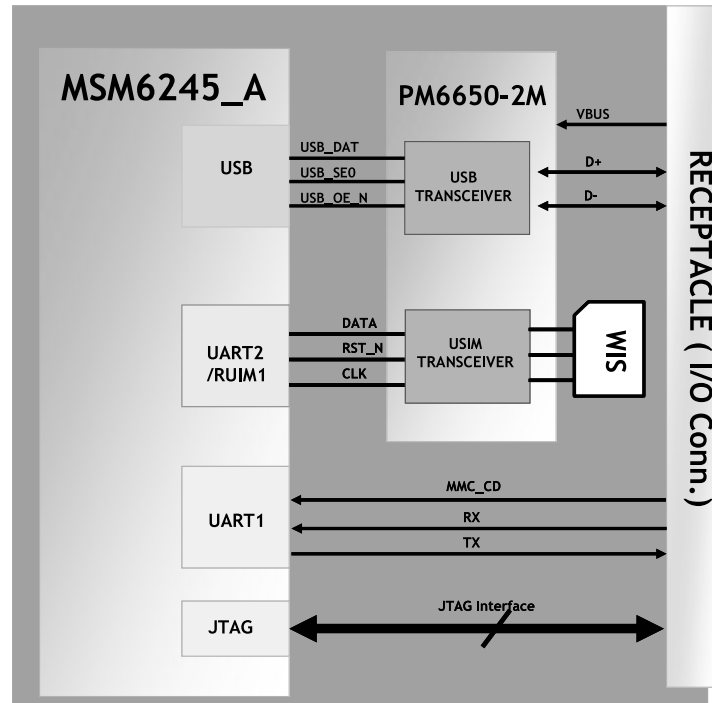


**[Fig 2.4] USB, UART, SIM, JTAG Interface**

# 6. BLOCK DIAGRAM

## Main RF signal

| Main RF signal | Description | Comment |
|---|---|---|
| GSM 900 TX | GSM 900 TX RF Signal | |
| DCS TX | DCS TX RF Signal | |
| PCS TX | PCS TX RF Signal | |
| UMTS2100 TX | UMTS2100 TX RF Signal | |
| GSM 900 RX | GSM 900 RX RF Signal | |
| DCS RX | DCS RX RF Signal | |
| PCS RX | PCS RX RF Signal | |
| UMTS2100 RX | UMTS2100 RX RF Signal | |
| TX_I/Q | I/Q for Tx of RF | |
| RX_I/Q | I/Q for Rx of RF | |

## Control signal

| Control signal | Description | Comment |
|---|---|---|
| *UMTS PA_CTL signal* | | |
| PA_R0 | UMTS Tx High/Low Power Control | |
| *GSM PA_CTL signal* | | |
| GSM_PA_BAND | DCS or PCS /GSM Mode Selection | |
| GSM_PA_EN | Power Amp Gain Control Enable | |
| GSM_PA_RAMP | Power Amp Gain Control | |
| ANT_SEL 0,1 | Ant Switch Module Mode Selection | *UMTS, GSM900Tx/Rx, DCS Tx/Rx, PCS Tx/Rx* |

# 7. CIRCUIT DIAGRAM
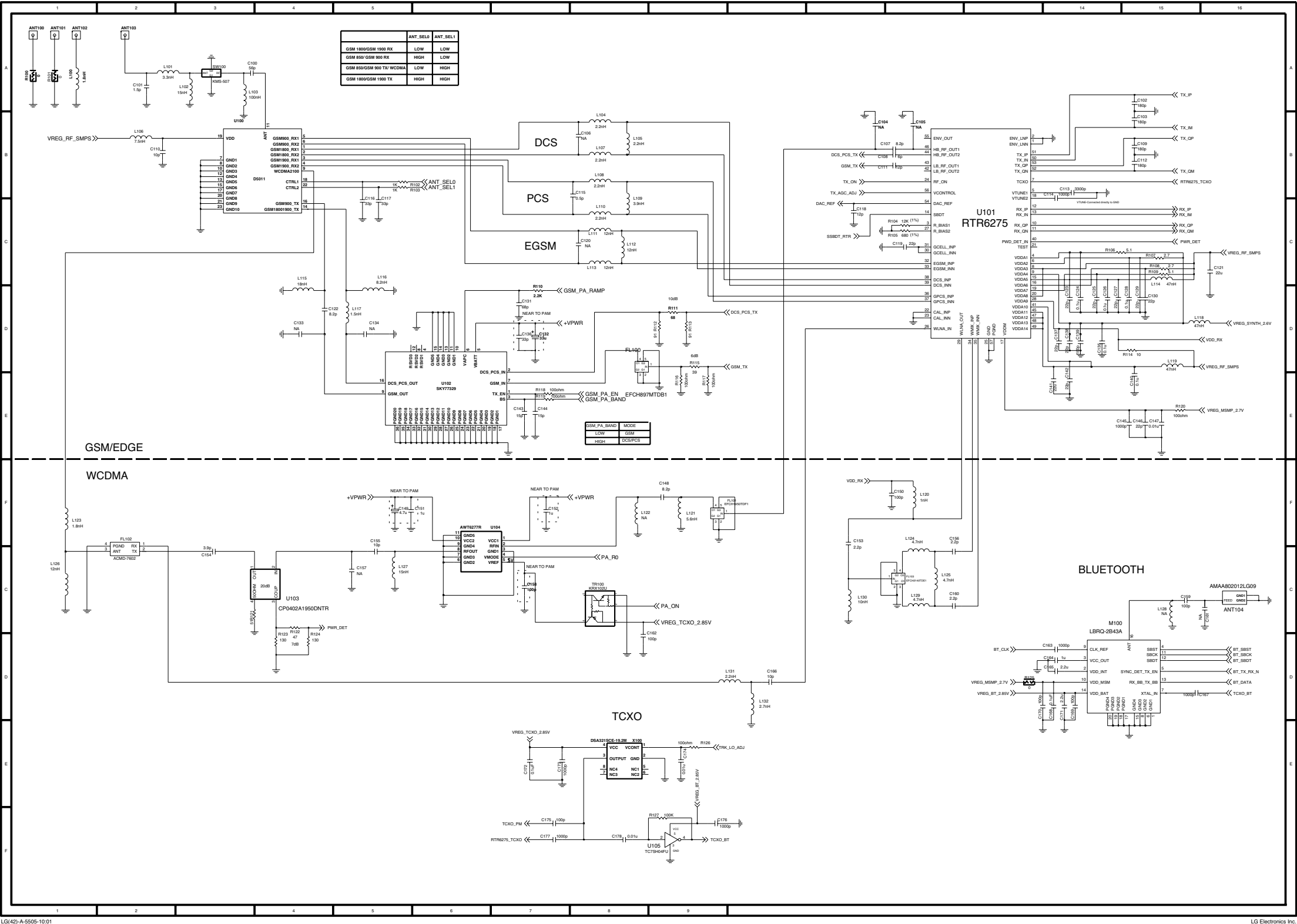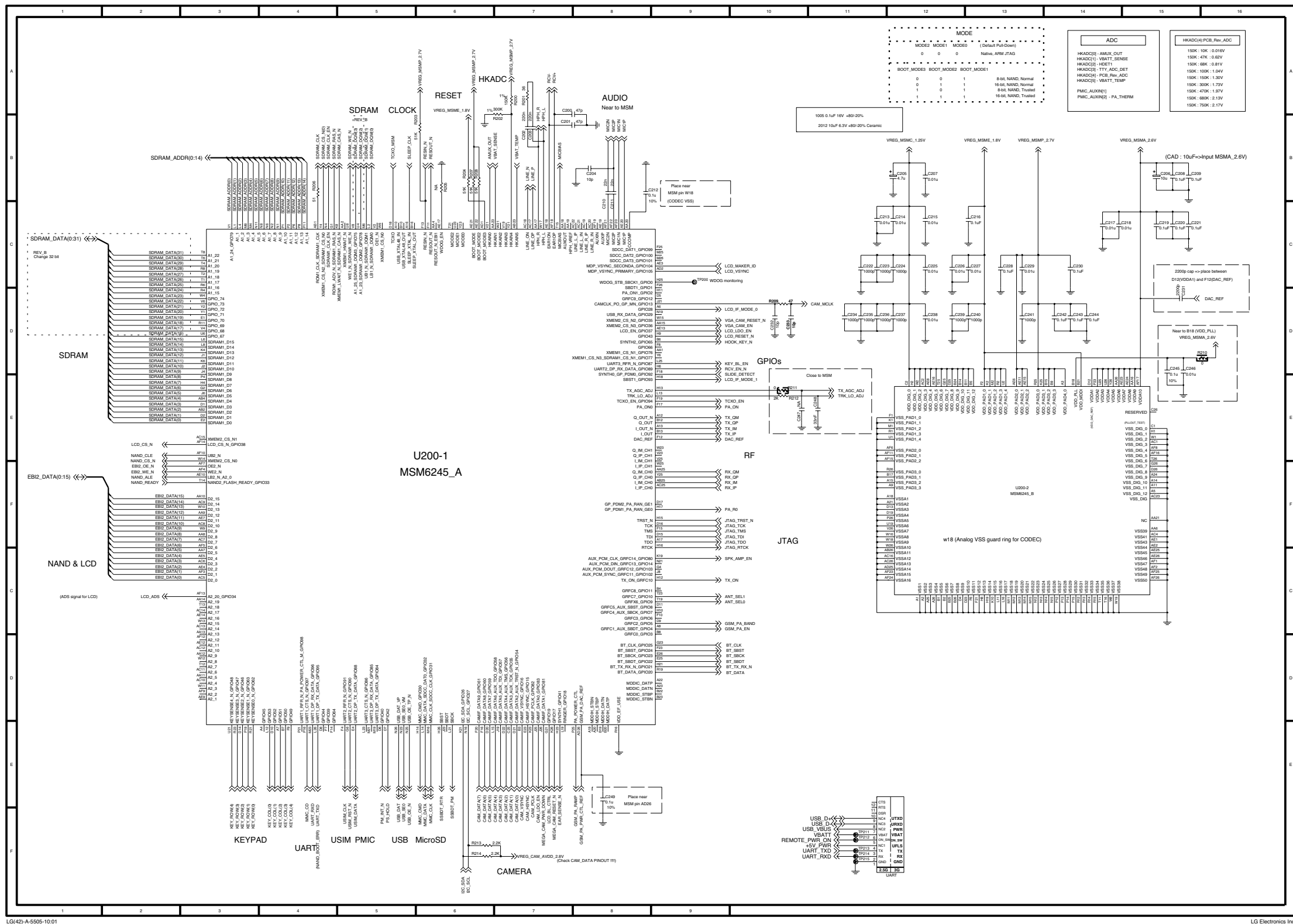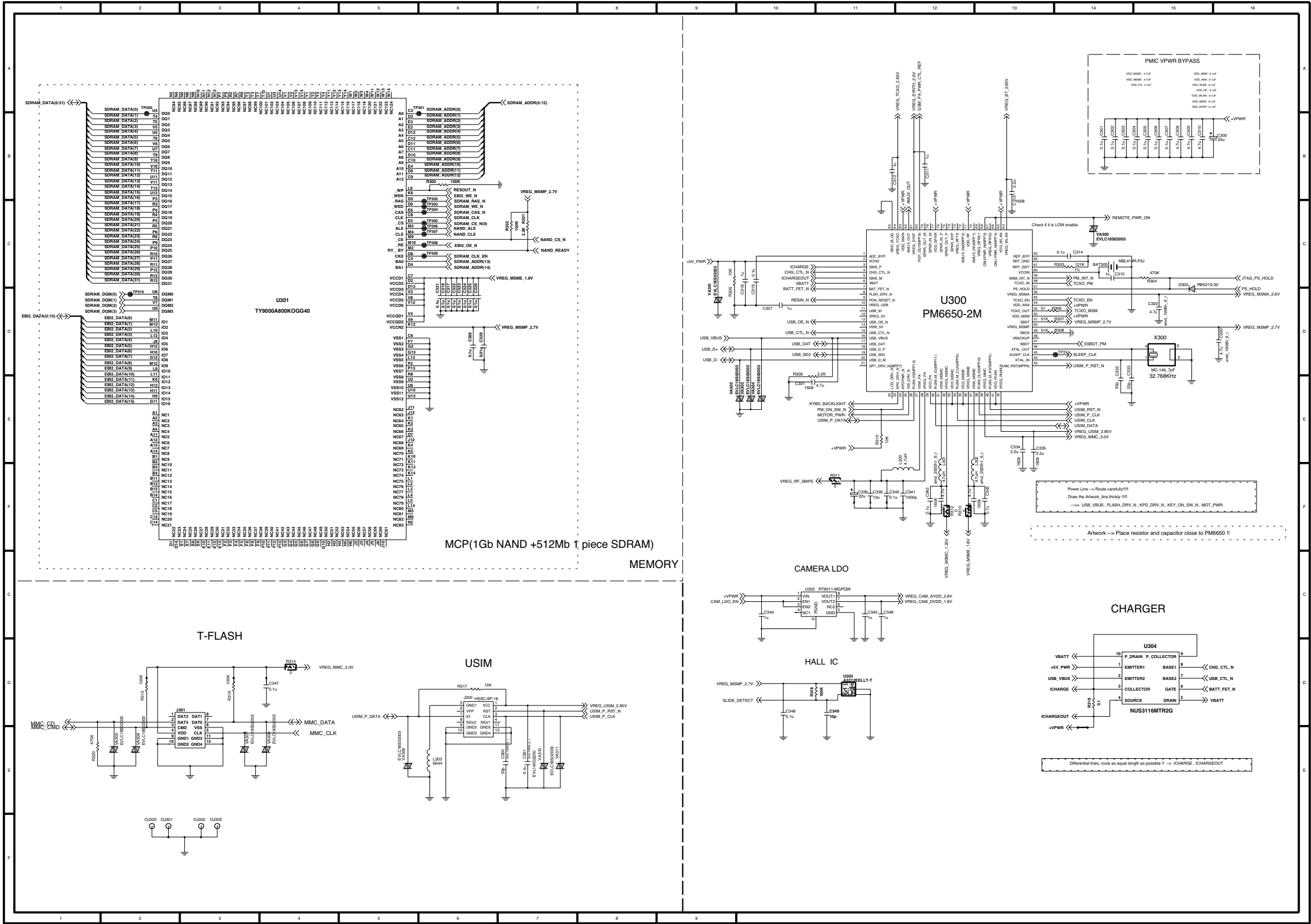
# 7. CIRCUIT DIAGRAM



MCP(1Gb NAND +512Mb 1 piece SDRAM)

MEMORY

T-FLASH

USIM

HALL IC

CAMERA LDO

CHARGER

# 7. CIRCUIT DIAGRAM

# 7. CIRCUIT DIAGRAM



FPCB CONNECTOR

LCD LDO

VIBRATOR PAD

SPEAKER PAD

LCD BACKLIGHT

KEY ON

LCD CONNECTOR

KEY LED

**SLIDE to FPCB Connector**

**FPCB to SUB Connector**

**FPCB to VGA Camera Connector**
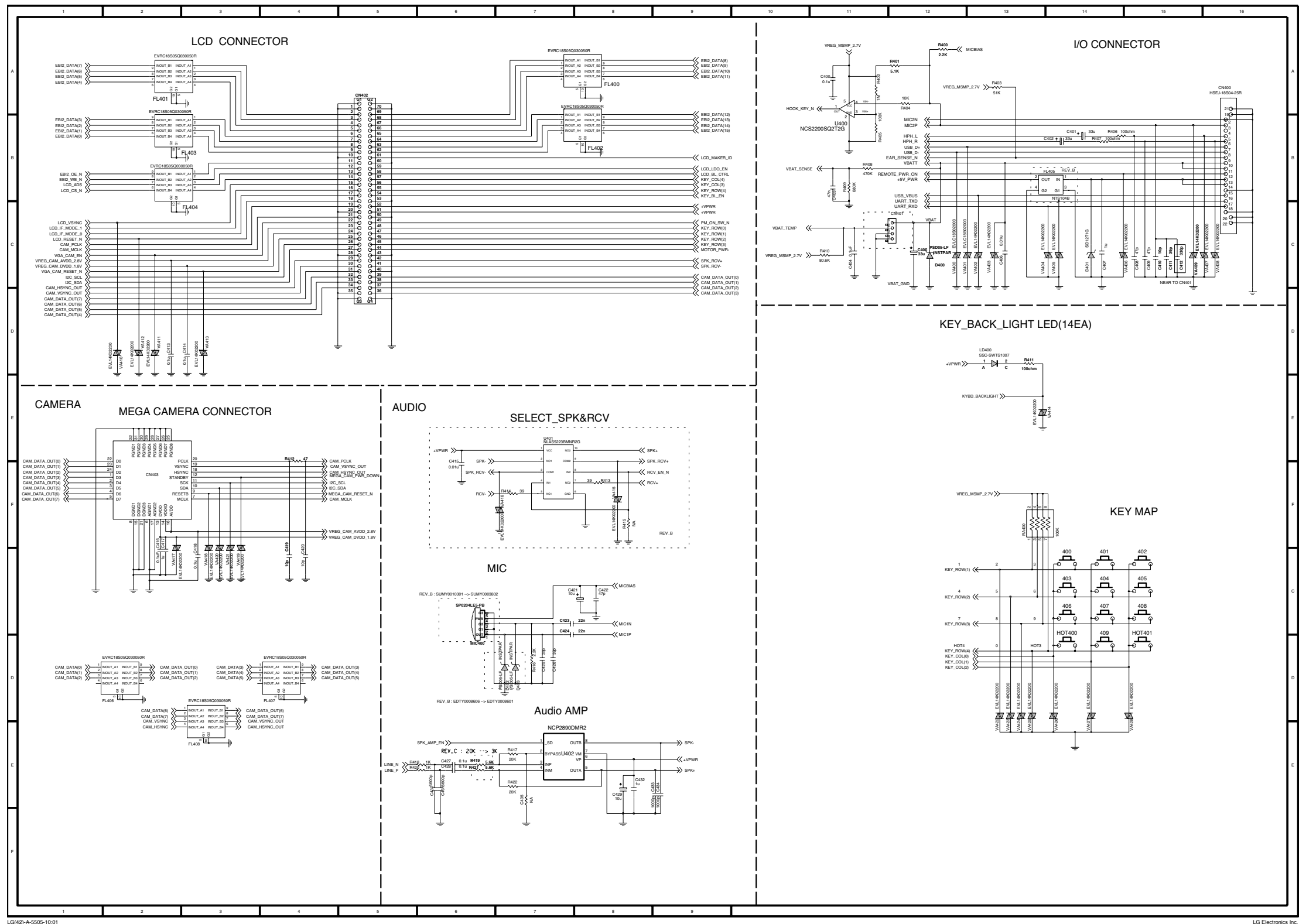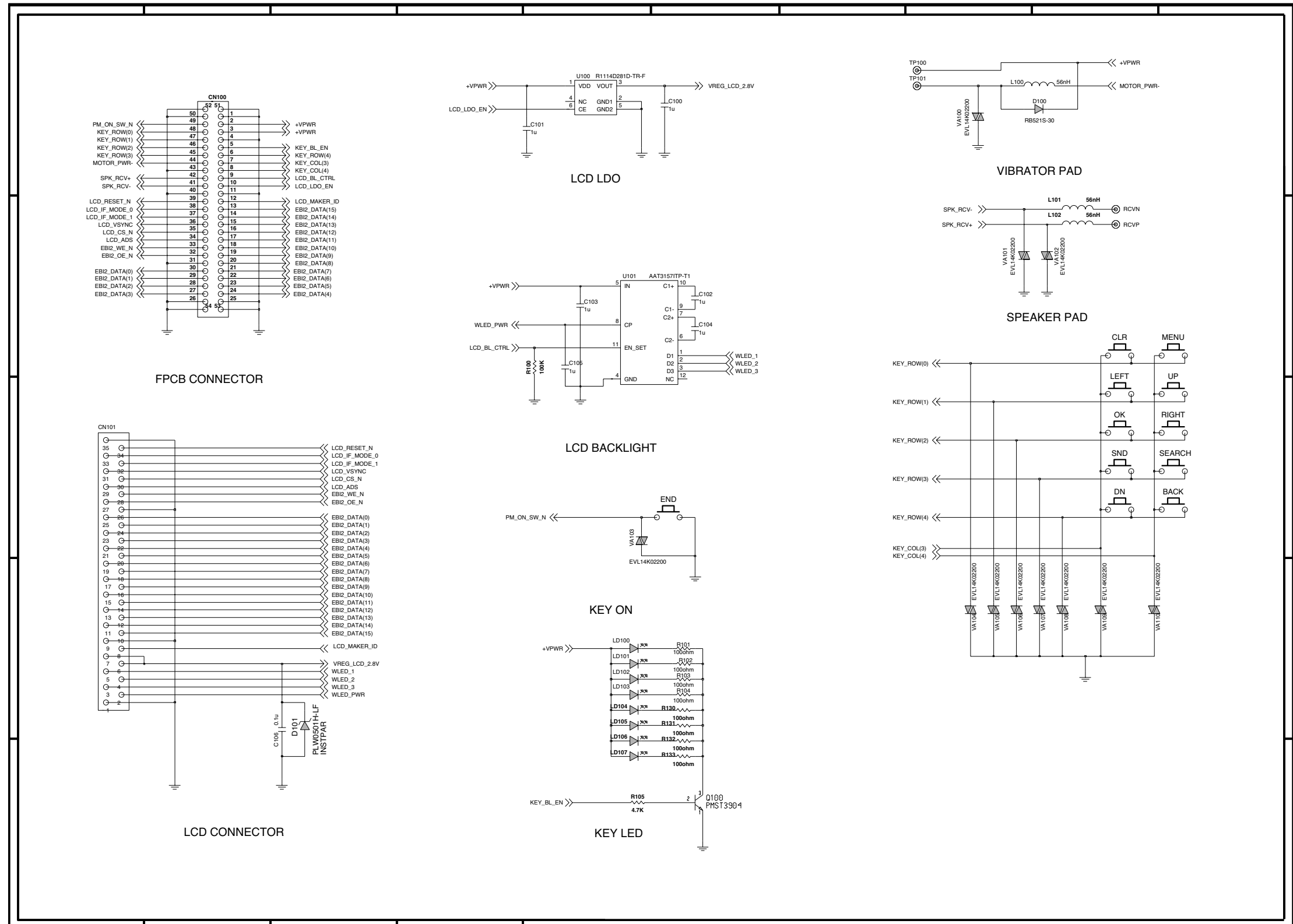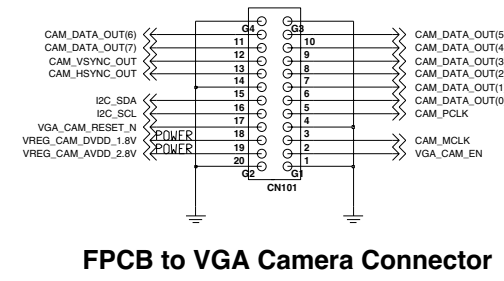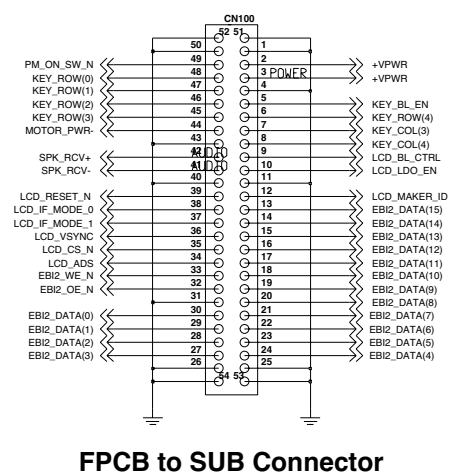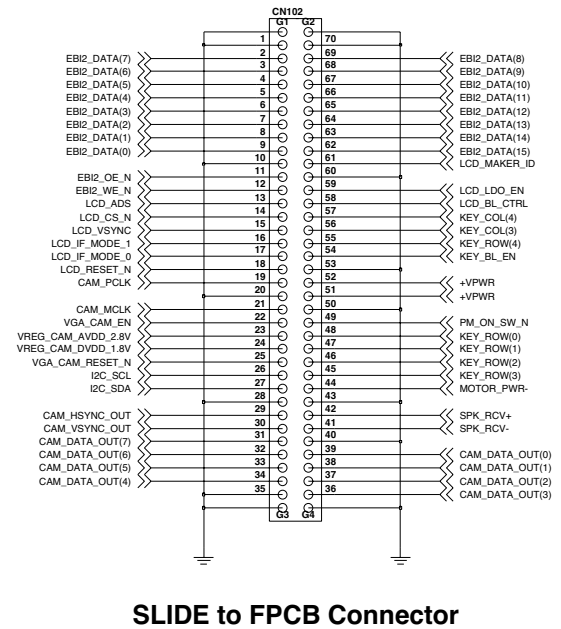
# 8. BGA IC PIN MAP

**MSM6245 pin map**



○ Used

● Not used

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● |
| B | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● |
| C | ● | ● | ○ | O | O | O | O | O | O | O | O | O | ● | ● |
| D | ● | O | ○ | O | O | O | O | O | O | O | O | O | O | ● |
| E | ● | O | ○ | O | O | O | O | O | O | O | O | O | O | ● |
| F | | O | ○ | O | O | O | O | O | O | O | O | O | O | |
| G | | O | ○ | O | O | O | O | O | O | O | O | O | O | |
| H | | O | ○ | O | O | O | O | O | O | O | O | O | O | |
| I | | O | ○ | O | O | O | O | O | O | O | O | O | O | |
| J | | O | ● | O | O | O | O | O | O | O | O | O | O | |
| K | | O | ○ | ● | O | O | O | O | O | O | O | O | O | |
| L | | O | ● | O | ● | O | O | O | O | O | O | O | O | |
| M | | O | ● | O | ● | O | O | O | O | O | O | O | O | |
| N | | ● | ○ | ● | O | O | O | O | O | O | O | O | O | |
| O | | O | ○ | O | O | O | O | O | O | O | O | O | O | |
| P | | O | ○ | O | O | O | O | O | O | O | O | O | O | |
| Q | | O | ○ | O | O | O | O | O | O | O | O | O | O | |
| R | | O | ○ | O | O | O | O | O | O | O | O | O | O | |
| S | ● | O | ○ | O | O | O | O | O | O | O | O | O | O | ● |
| T | ● | O | ○ | O | O | O | O | O | O | O | O | O | O | ● |
| U | ● | O | ○ | O | O | O | O | O | O | O | O | O | O | ● |
| V | ● | O | ○ | O | O | O | O | O | O | O | O | O | O | ● |
| W | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● |
| Y | ● | ● | ● | ● | | | | | | | ● | ● | ● | ● |

○ Used
● Not used

U301 (EUSY033690)

## PM6650 Pin map

# 9. PCB LAYOUT

U102,104 Power Amp
-No Tx call
-Low Tx power

F100,F101
Tx RF filter
-No Tx call

CON402 70pin connector
-Main LCD doesn't display

FL102
C132
U102
U10
U104
R100
U302

FL404
FL403
FL401
FL400
FL402
RA400
CN402
U303

LD400

| 400 | 401 | 402 |
| 403 | 404 | 405 |
| 406 | 407 | 408 |
| HOT400 | 409 | HOT401 |
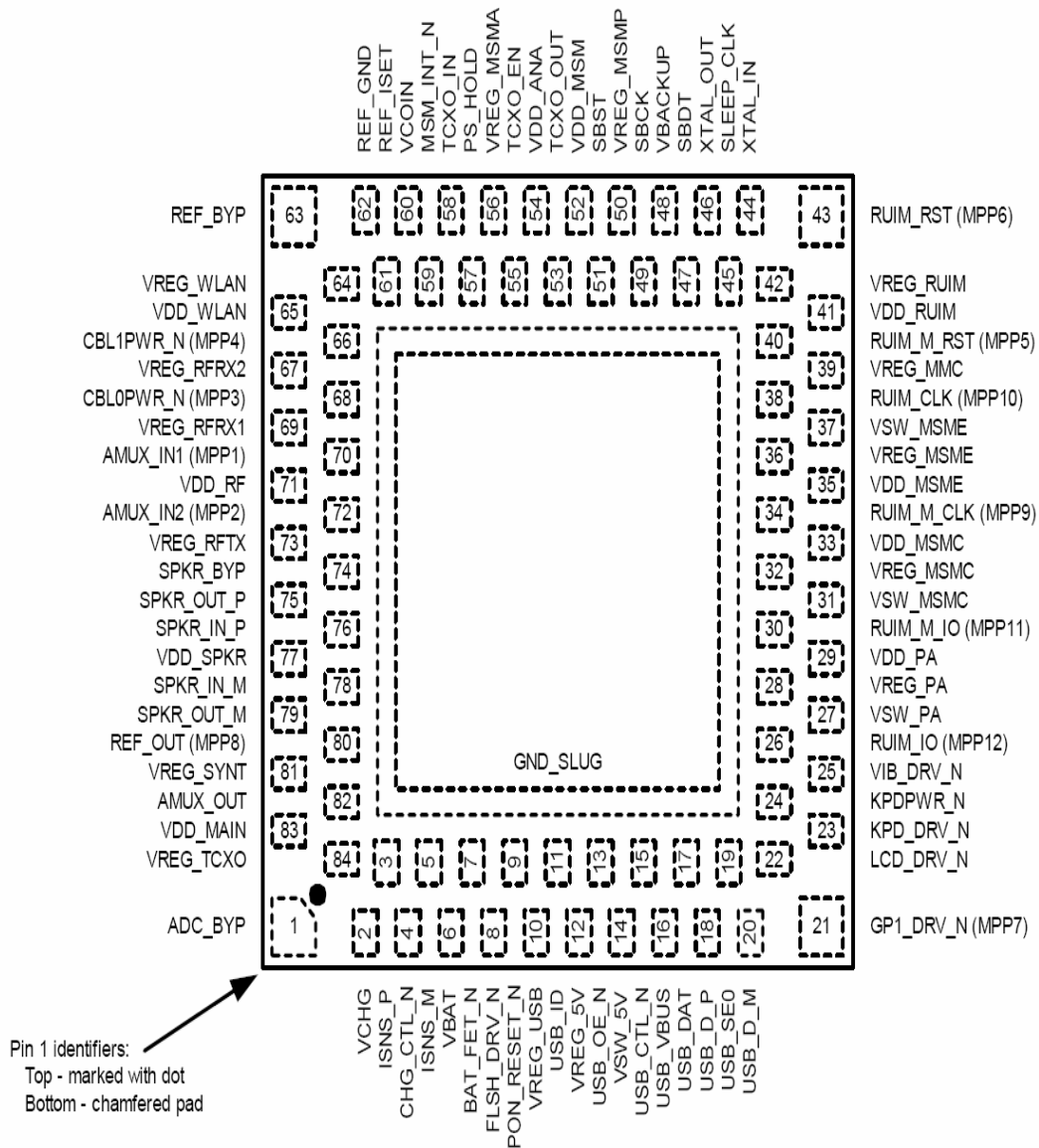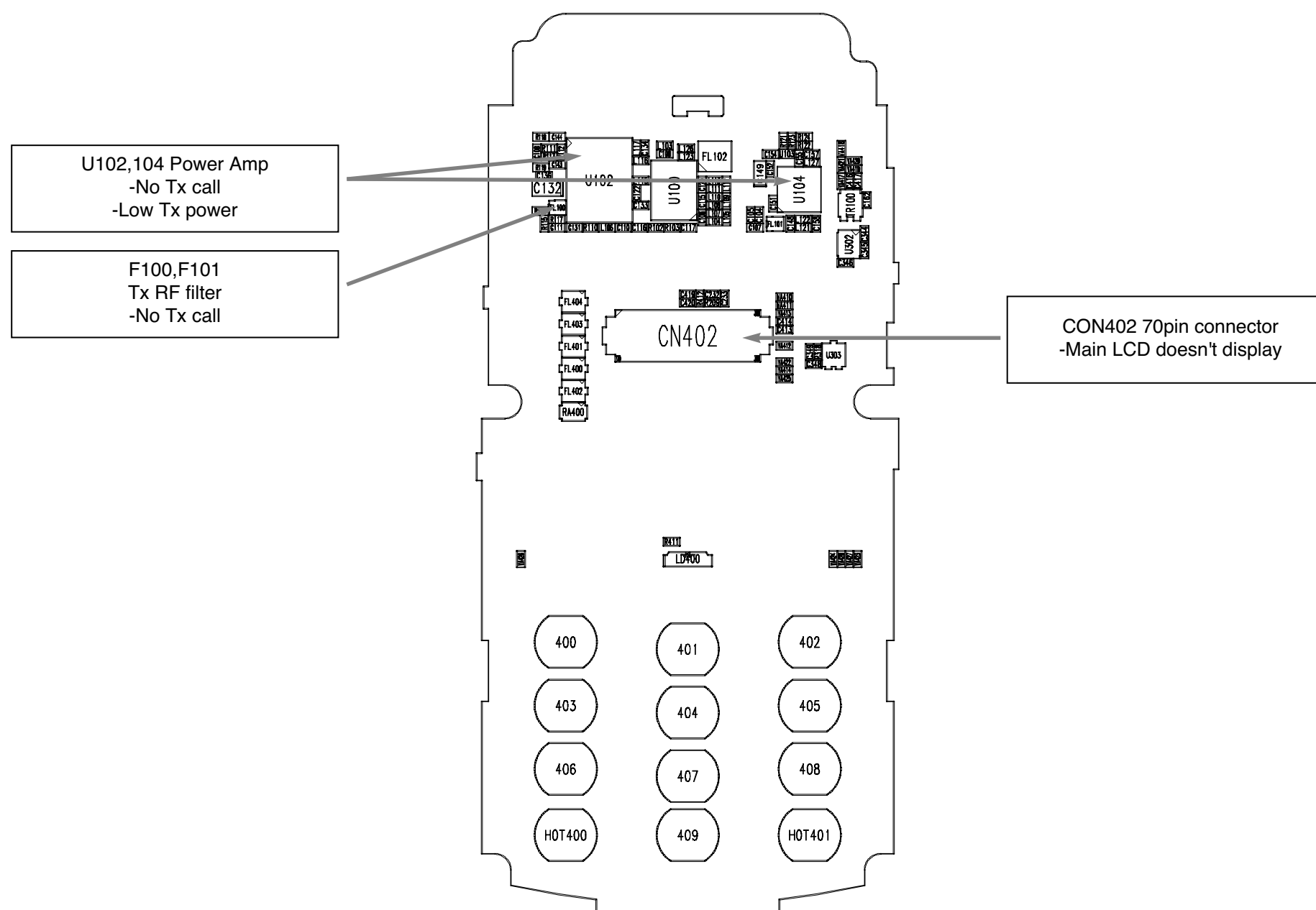
KU380-MAIN-SPFY0157401_1.0-TOP

# 9. PCB LAYOUT



CN400 Receptacle
-No Power on
-No DM connection

U101 RFR6275
-No service
-Low sensitivity
-No TX Call

U200 MSM6245
-No boot

U301 Memory
-No Boot

U300 PMIC
-Power unable despite
pressing power-on key

M100 Bucktooth chip
-No BT service
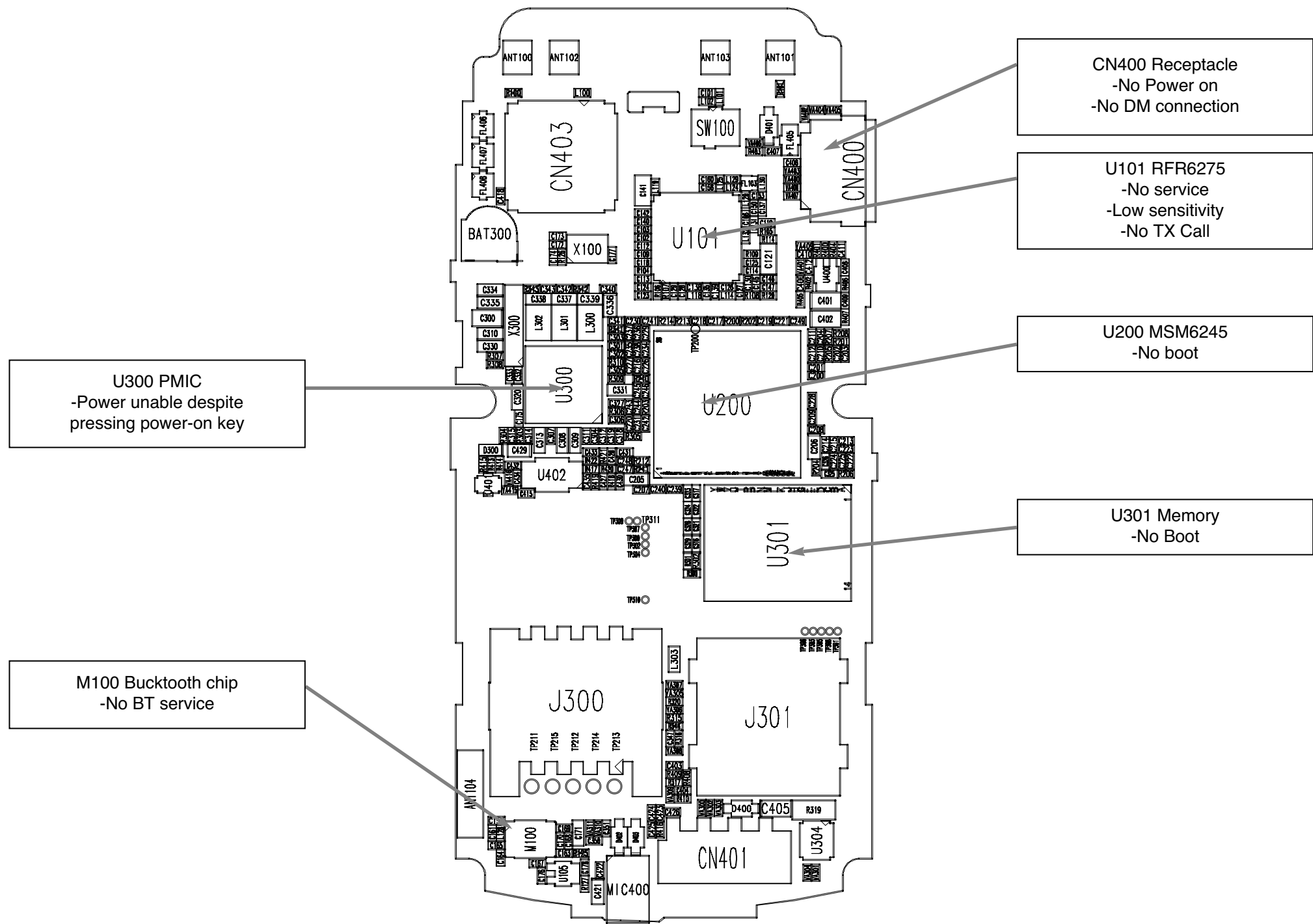
KU380-MAIN-SPFY0157401_1.0-BOT
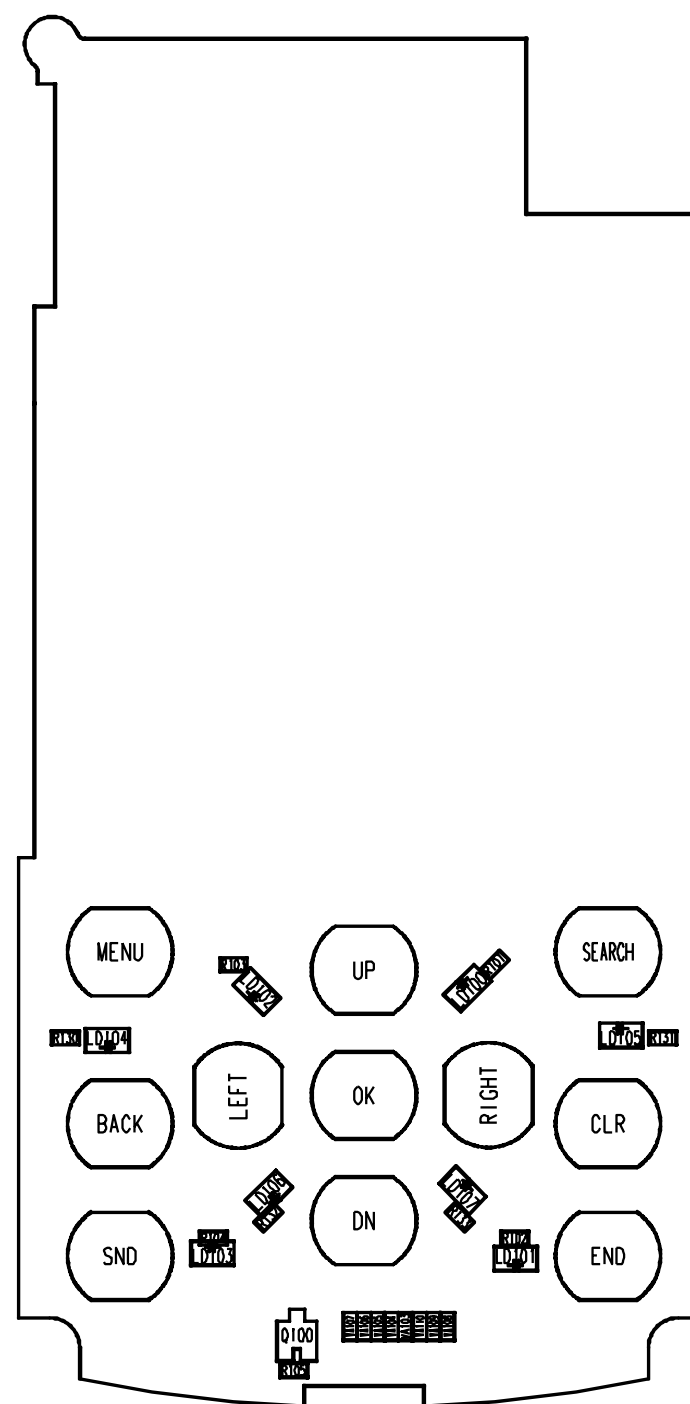
# 9. PCB LAYOUT



KU380-SUB-1.0 TOP

# 9. PCB LAYOUT

CN100

CN101

U101

U100
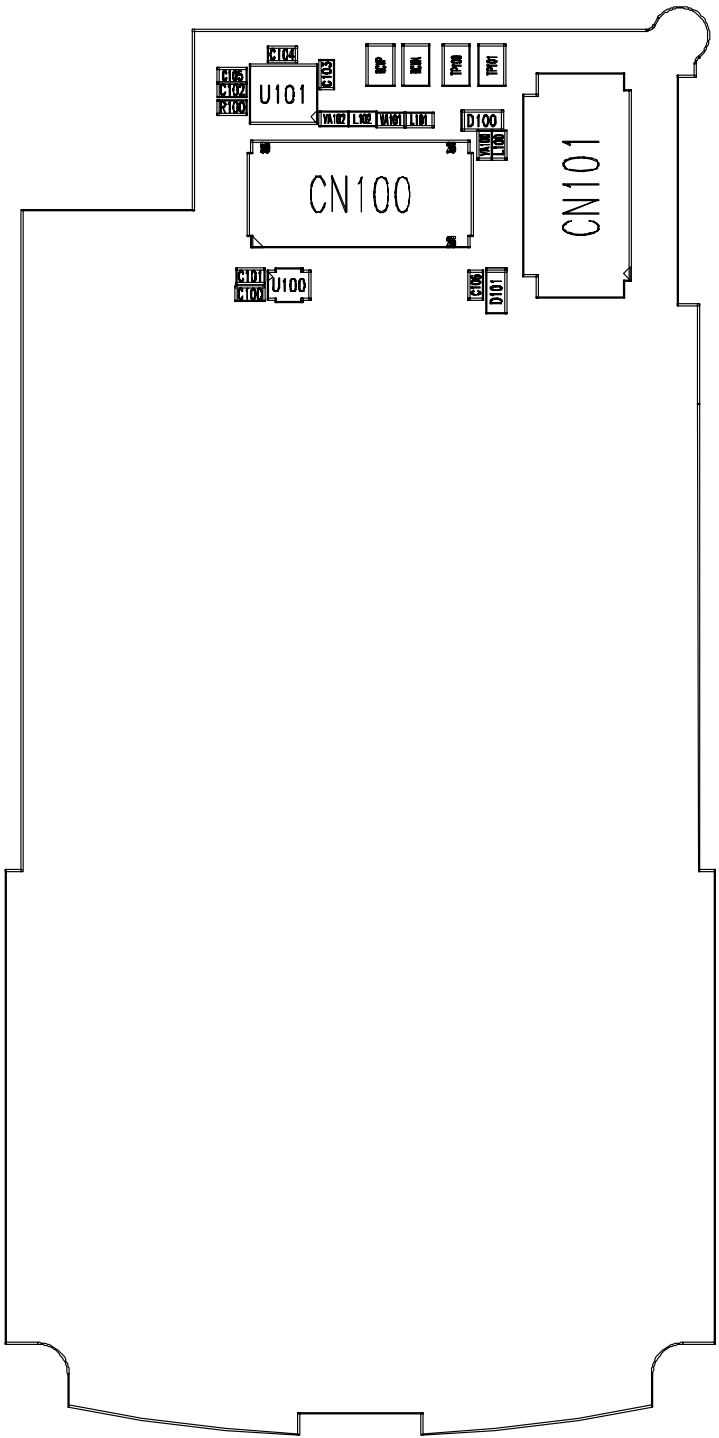
KU380-SUB-1.0 BOTTOM

# 9. PCB LAYOUT

CN101

CN100

CN102
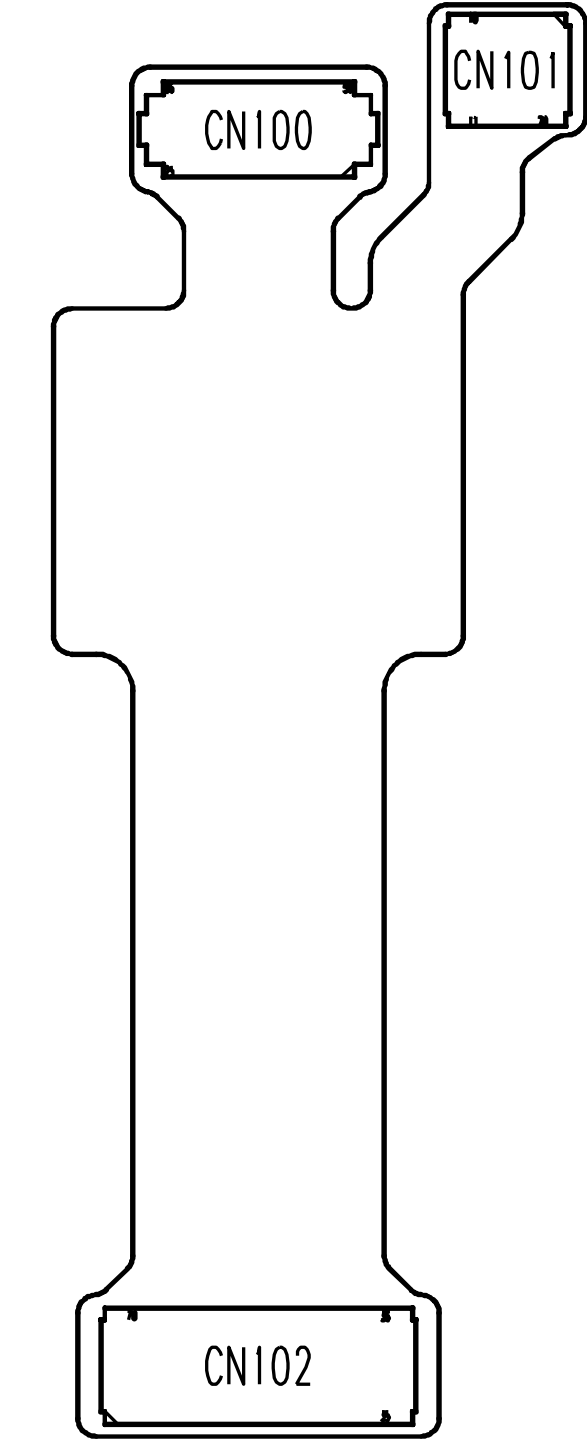
KU380 FLCD-1.0 TOP

# 10. Calibration & RF Auto Test Program (Hot Kimchi)

## 10.1 Configuration of HOT KIMCHI

### 10.1.1 Configuration of directory

```
C:  ──  Cm_Grut  ──┬── Common  ──┬── dll_serialat  ──  LG_CL_009.dll
                   │             │
                   │             ├── Log
                   │             │
                   │             ├── At_Serial_Cmd.xml
                   │             │
                   │             ├── Diag_NV6250_RevB.dll
                   │             │
                   │             ├── Diag_NV6275.dll
                   │             │
                   │             ├── Diag_NV.dll
                   │             │
                   │             ├── DLL_E5515CD.DLL
                   │             │
                   │             ├── DLL_PwrControlD.dll
                   │             │
                   │             ├── Dll_SerialATD.dll
                   │             │
                   │             ├── LG_CL_011.dll
                   │             │
                   │             └── PwrSupply_Cmd.xml
                   │
                   └── Debug  ──┬── Auto  ──  KU250
                                │
                                ├── Cal  ──  KU250
                                │
                                └── CalAuto  ──  KU250
```

: Directory
: File

# 10. Calibration & RF Auto Test Program (Hot Kimchi)

```
Hot_Kimchi ─┬─ Debug
            ├─ image
            ├─ Log
            ├─ ComLMPLib_11.dll
            ├─ Dll_EzLooksMQ_004.dll
            ├─ GuiTk115d.dll
            ├─ HK_25.exe
            ├─ ijl11.dll
            ├─ SBCmd.xml
            └─ ShieldBox_DllD.dll

Model ─┬─ KU250 ─┬─ Log
       │         ├─ AutoSetup_110.xml
       │         ├─ Cal_Setup_Test.xml
       │         ├─ Ezlooks.xml
       │         ├─ LG_RfCal_Q3G6280N_Polar_006.dll
       │         ├─ Procedure_KU250_103.xml
       │         ├─ script_auto_001.xml
       │         ├─ script_cal_003.xml
       │         └─ Spec_3GPP_030.xml
       ├─ LG_RfTest_E5515C_211.dll
       └─ QMSL_MSVC6R.dll
```

■ : Directory
□ : File

| dll,ocx | | |
|---|---|---|
| | (Win98)MFCD DLL COPY.bat | |
| | (Win2000)MFCD DLL COPY.bat | |
| | (WinXP)MFCD DLL COPY.bat | |
| | MFC42D.DLL | |
| | MFCD42D.DLL | |
| | MFCN42D.DLL | |
| | MFCO42D.DLL | |
| | MSVCP60D.DLL | |
| | MSVCRTD.DLL | |
| | Vsflex7L.ocx | |
| | vsflex7l_ocx_regist.bat | |
| **Result** | Auto | KU380 |
| | Cal | KU380 |
| | CalAuto | KU380 |
| **UI** | image | result.bmp |
| | LG_UI_Ad6500_002.dll | |
| | LG_UI_EmKU250_001.dll | |
| | LG_UI_Qu6250_003.dll | |
| | LG_UI_Qu6275_004.dll | |
| 1. _New_HK_0808.reg | | |

| | |
|---|---|
| ■ | : Directory |
| ▢ | : File |

## 10.2 How to use HOT KIMCHI



* **Procedure**

1. Click "Logic Operation" of "SETTING" menu bar

2. Select "UART Port" that PC can communicate with the phone

3. Select "LOGIC MODE" that you want

- Logic Mode -> 1: Calibration Only
                2: Auto Test Only
                3: Calibration + Auto
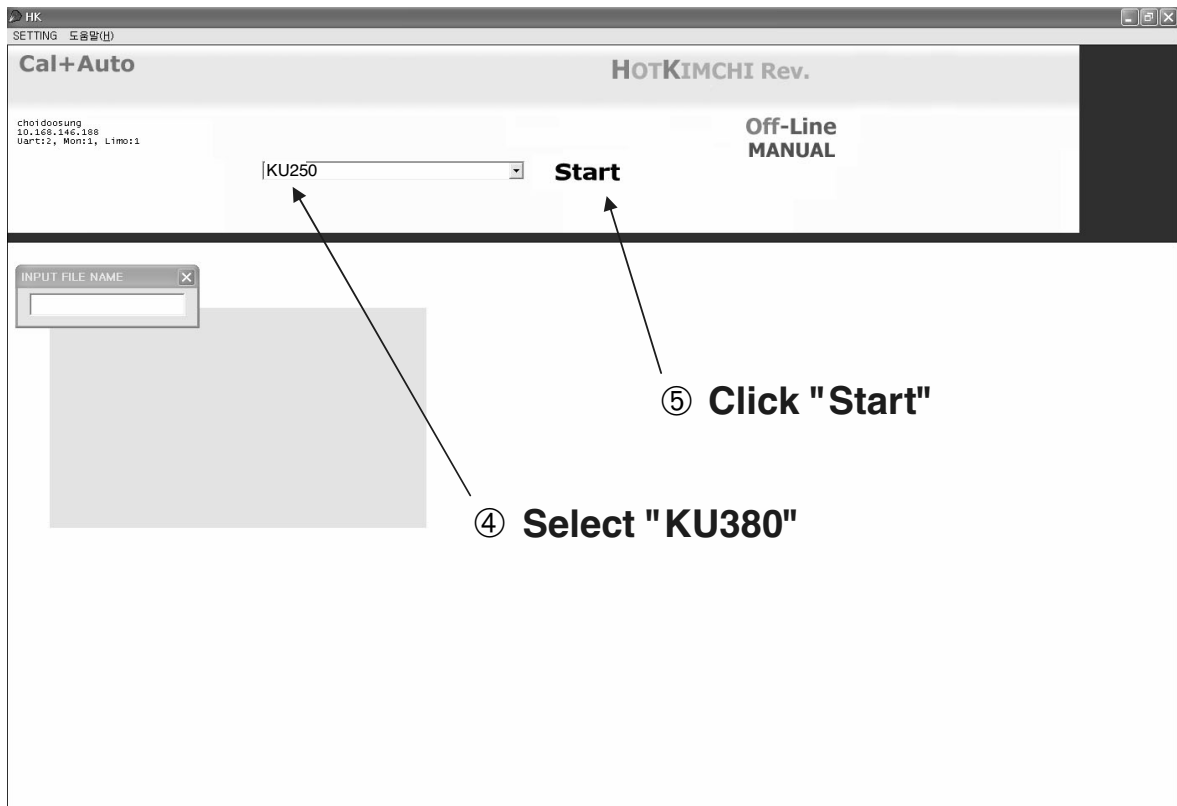
* **Procedure**

4. Select the model name "KU380"

5. Click "Start" button

# 11. Factory Test Mode

## 11.1 Factory Test Mode

1) Open "LG FTM GUI"

2) Click "Options >> Port Settings"

3) Select Com Port and click "OK"
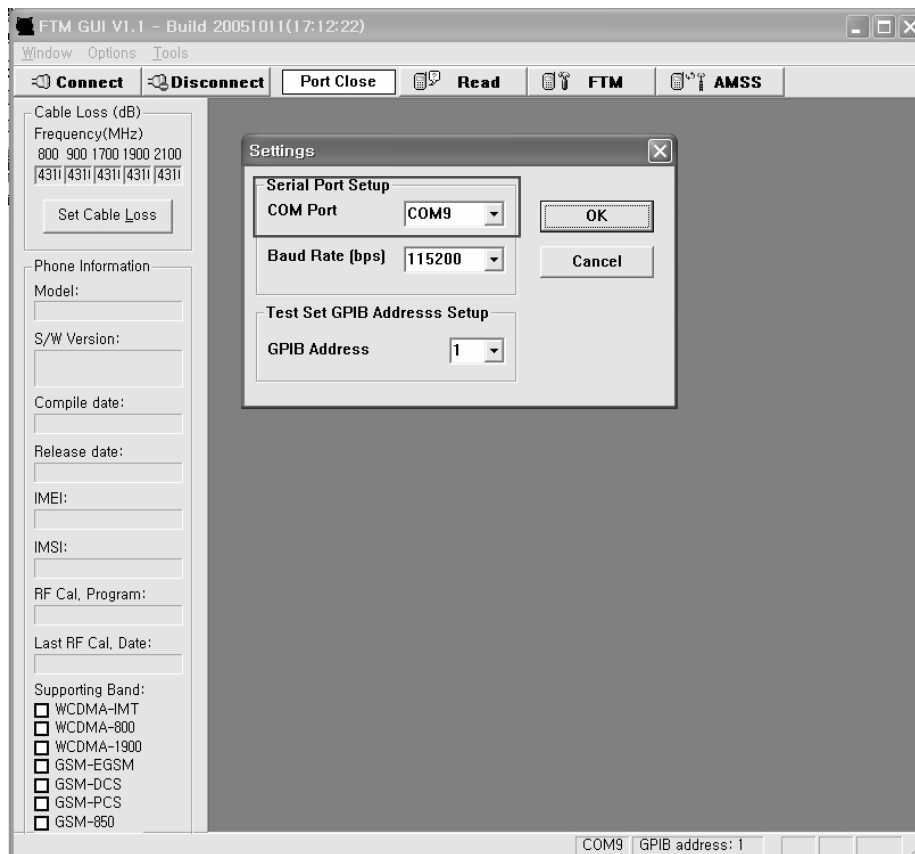


## 11.2 WCDMA Test Mode

1) Click "Tools >> FTM GUI WCDMA"

2) Select "FTM" Mode

3) Select RF Frequencies, insert "9750" in "Uplink chan" and push "Enter". Then "2140" is written at Rx UHF automatically.

4) For Deciding to "TX AGC", insert 380 as a maximum value . And then WCDMA Power is decided.

5) To set PA Range, select ON in R1 for High power mode or select ON in R0 for Low power mode.

6) Depending on a situation, Click "Tx On" or "Tx Off".
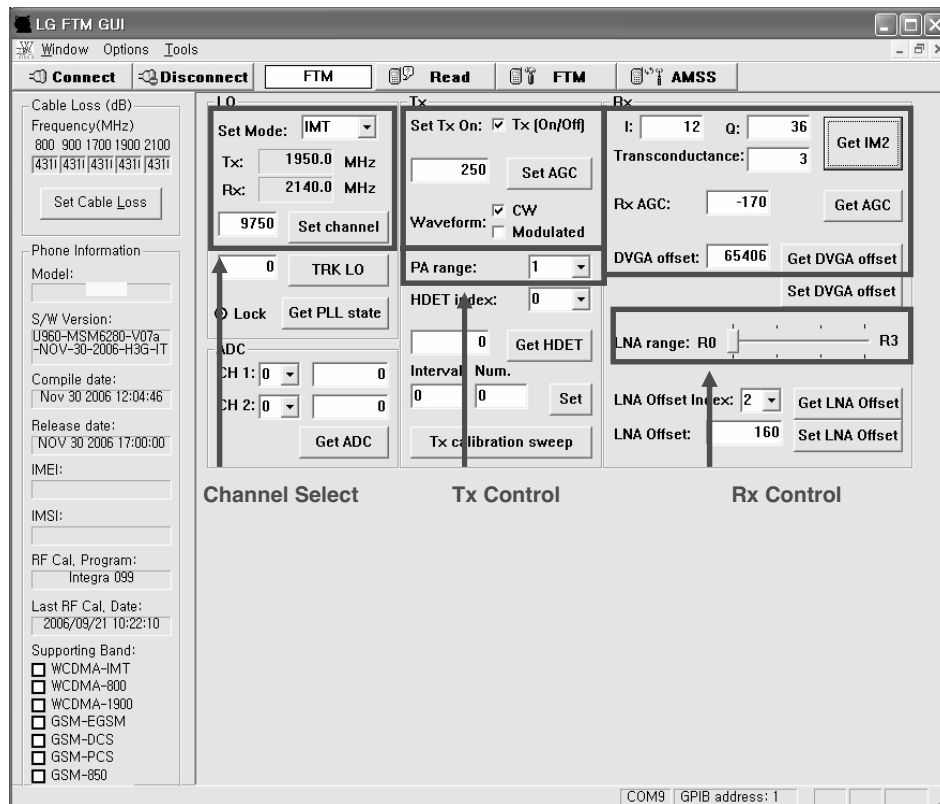
7) Set Rx mode. Click LNA Range, 0~4.

8) Click "Get IM2" and "Get Rx AGC". Confirm the value.

## 11.3 GSM Test Mode

1) To switch GSM Mode, Select Mode → GSM mode at menu commands.

2) Select RF Mode, Click "GSM" or "GSM1800" or "GSM1900"

3) Write wanted channel. We usually set " 1"

4) For Deciding to "PA DAC Value", insert 14300 as a maximum value

5) Click "Tx On" or "Tx Off".

6) SET RX mode. Click LNA Range, 0~4.

7) Click "RX ON"

# 11. Factory Test Mode
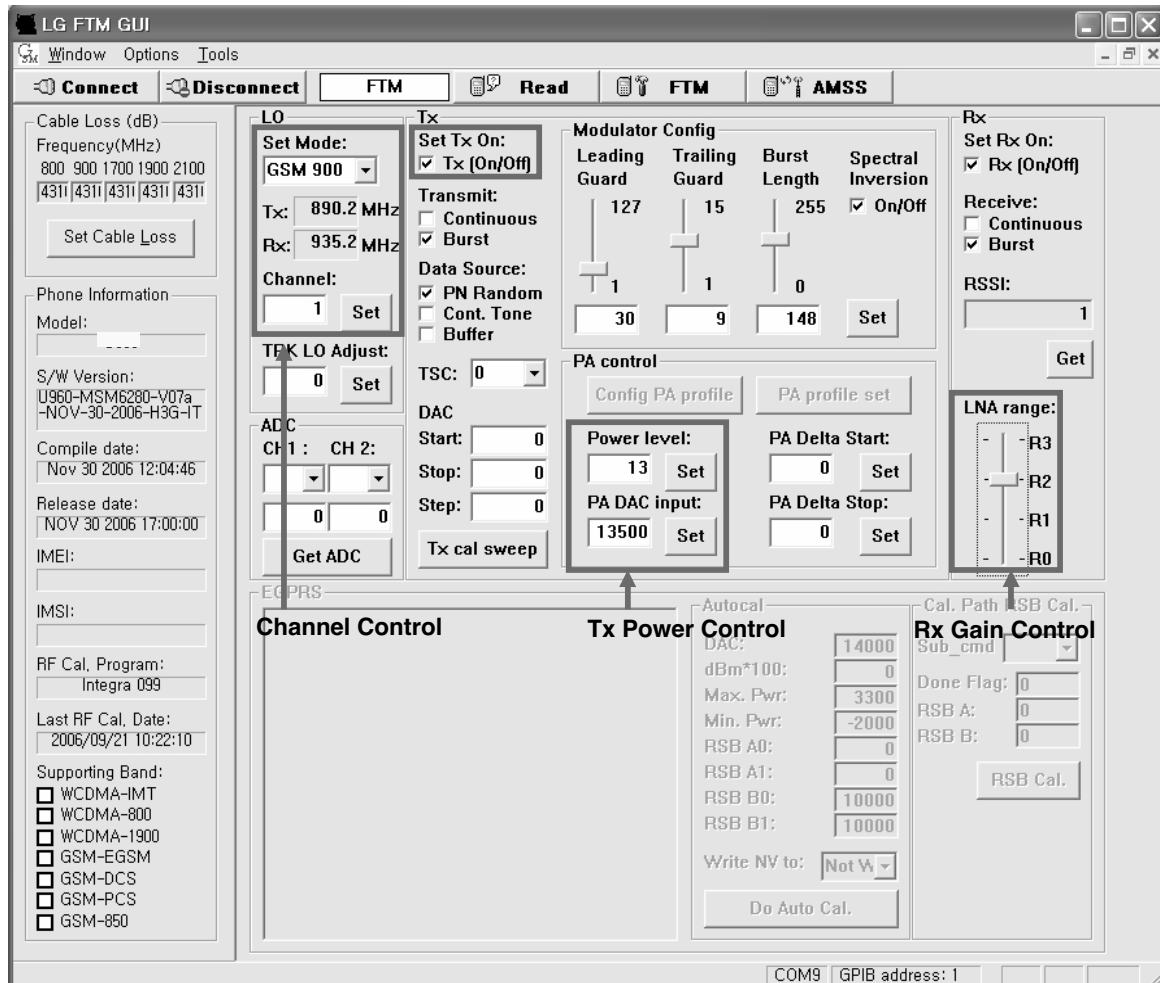
# 12. EXPLODED VIEW & REPLACEMENT PART LIST

## 12.1 EXPLODED VIEW
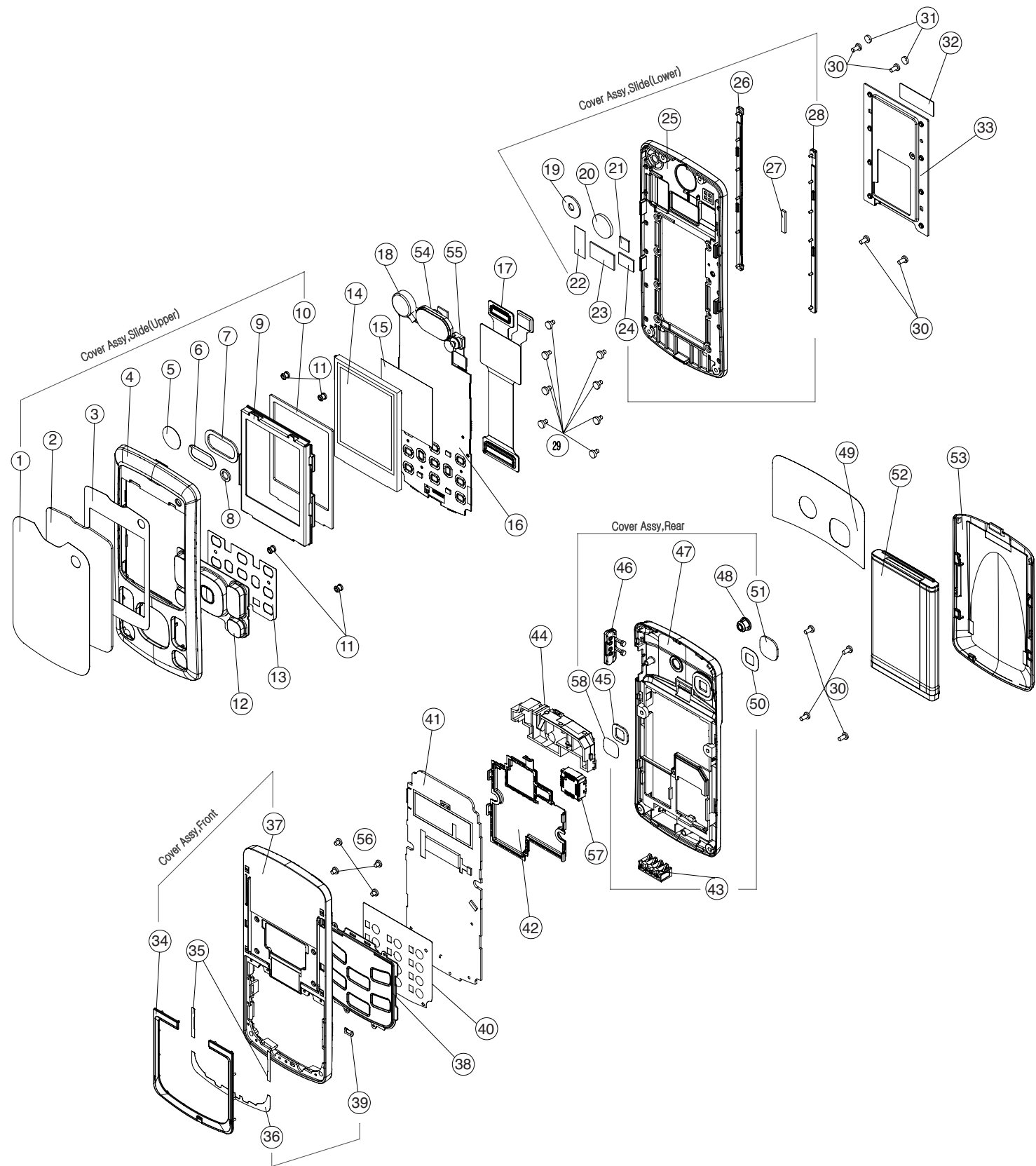


| NO. | DESCRIPTION | Q'TY | DRAWING NO. | REMARK |
|---|---|---|---|---|
| 58 | Protection, Rear IN | 1 | MTAB0189101 | |
| 57 | Camera, MEGA | 1 | SVCY0014401 | |
| 56 | Screw Machine,Bind | 4 | GMZZ0024001 | |
| 55 | Camera, | 1 | SVCY0015301 | |
| 54 | Speaker | 1 | SUSY0026801 | |
| 53 | COVER,BATTERY | 1 | MCJA0046501 | |
| 52 | BATT_PACK | 1 | SBPL0089902 | |
| 51 | Window,Camera | 1 | MWAE0027101 | |
| 50 | Tape,camera | 1 | MTAK0001901 | |
| 49 | Tape,Protection | 1 | MTAB0179801 | |
| 48 | Cap,Mobile Switch | 1 | MCCF0044801 | |
| 47 | Cover,Rear | 1 | MCJN0069701 | |
| 46 | Cap,Earphone Jack | 1 | MCCC0046301 | |
| 45 | Pad,Camera | 1 | MPBT0043501 | |
| 44 | Intenna | 1 | SNGF0027801 | |
| 43 | CNT_BATT_4P58 | 1 | ENZY0019701 | |
| 42 | CAN,SHIELD | 1 | MCBA0020101 | |
| 41 | Pcb Assy,Main | 1 | SAFY0219701 | |
| 40 | DOME ASSY,METAL | 1 | ADCA0068501 | |
| 39 | Filter,Mike | 1 | MFBD0024601 | |
| 38 | Button Assy,main | 1 | ABGF0000201 | |
| 37 | Deco,Front | 1 | MDAG0028701 | |
| 36 | Tape,Deco | 1 | MTAA0139701 | |
| 35 | Tape,Deco | 2 | MTAA0139601 | |
| 34 | Deco,Front | 1 | MDAG0028701 | |
| 33 | SLIDE_HINGE_CLOSE | 1 | AHFB0003103 | |
| 32 | PAD.CONNECTOR | 1 | MPBU0005201 | |
| 31 | CAP,SCREW | 4 | MCCH0108801 | |
| 30 | Screw Machine,Bind | 4 | GMZZ0024001 | |
| 29 | Screw Machine,Bind | 8 | GMZZ0021901 | |
| 28 | Guide,LEFT | 1 | MGDA0009601 | |
| 27 | Magnet | 1 | MMAZ0004601 | |
| 26 | Guide,Right | 1 | MGDB0005001 | |
| 25 | Cover,Slide(Lower) | 1 | MCJV0011601 | |
| 24 | PAD.CONNECTOR | 1 | MPBU0009901 | |
| 23 | PAD.CONNECTOR | 1 | MPBU0009801 | |
| 22 | PAD_CON_ZIP | 1 | MPBU0010001 | |
| 21 | PAD,CAMERA | 1 | MPBT0043601 | |
| 20 | Pad,Speaker | 1 | MPBN0039001 | |
| 19 | Pad,Motor | 1 | MPBJ0046301 | |
| 18 | Motor | 1 | SJMY0006506 | |
| 17 | SLIDE,FPCB | 1 | SACY0062201 | |
| 16 | Pcb Assy,sub | 1 | SAJY0026201 | |
| 15 | TAPE,FLEXIBLE PCB | 1 | MTAJ0001101 | |
| 14 | LCD,MODULE | 1 | SVLM0026001 | |
| 13 | DOME ASSY,METAL | 1 | ADCA0068401 | |
| 12 | Button Assy,sub | 1 | ABGG0000401 | |
| 11 | Insert | 4 | MICZ0021601 | |
| 10 | Pad,LCD | 1 | MPBG0063401 | |
| 9 | Bracket,LCD | 1 | MBFF0014401 | |
| 8 | Pad,Camera | 1 | MPBT0043401 | |
| 7 | Pad,Speaker | 1 | MPBN0038701 | |
| 6 | Filter,Speaker | 1 | MFBC0032301 | |
| 5 | Tape,Motor | 1 | MTAF0011101 | |
| 4 | Cover,Slide(Upper) | 1 | MCJW0013801 | |
| 3 | Tape,Window | 1 | MTAD0070801 | |
| 2 | Window,LCD | 1 | MWAC0081701 | |
| 1 | PROTECTION,WINDOW | 1 | MTAB0179701 | |

# ASS'Y EXPLODED VIEW
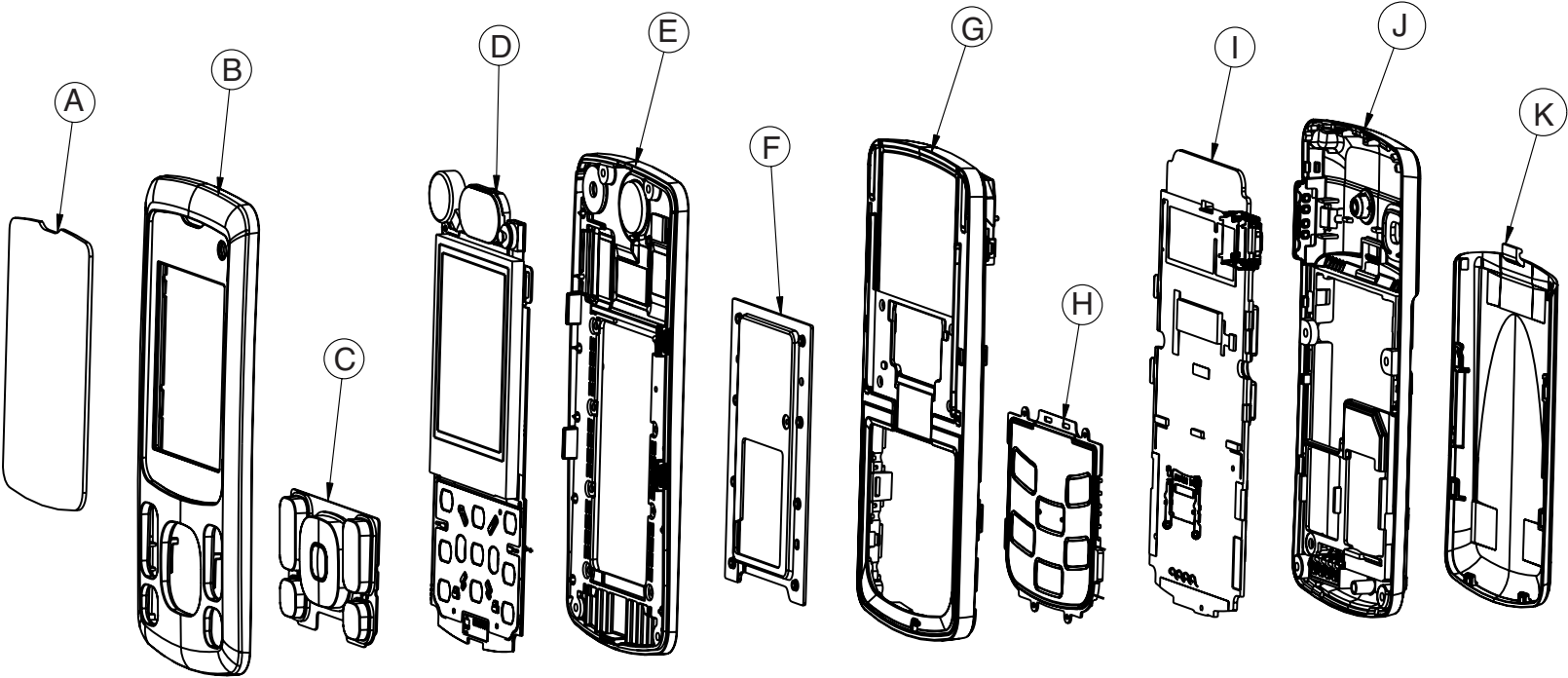


| NO. | DESCRIPTION | Q'TY | DRAWING NO. | REMARK |
|-----|-------------|------|-------------|--------|
| K | COVER, BATTERY | | MCJA00465## | |
| J | COVER, ASSY, REAR | | ACGM00928## | |
| I | PCB ASSY, MAIN | | SAFY02197## | |
| H | BUTTON, MAIN | | ABGF00002## | |
| G | COVER ASSY, FRONT | | ACGK00918## | |
| F | HINGE ASSY, SLIDE | | AHFB00031## | |
| E | COVER ASSY, LOWER | | ACGR00112## | |
| D | PCB ASSY, SUB | | SAJY00262## | |
| C | BUTTON ASSY, SUB | | ABGG00004## | |
| B | COVER ASSY, SLIDE UPPER | | ACGS00130## | |
| A | WINDOW, LCD | | MWAC00817## | |

## 12.2 Replacement Parts <Mechanic component>

**Note:** This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 1 | | IMT-2000(SLIDE) | TISL0002401 | | Black | |
| 2 | AAAY00 | ADDITION | AAAY0267201 | | Black | |
| 3 | MPAD00 | PACKING,SHELL | MPAD0005804 | PRINTING, (empty), , , , , | Without Color | |
| 3 | MPCY00 | PALLET | MPCY0013202 | | Blue | |
| 2 | APEY00 | PHONE | APEY0445901 | | Black | |
| 3 | ACGM00 | COVER ASSY,REAR | ACGM0092801 | | Black | J |
| 4 | ENZY00 | CONNECTOR,ETC | ENZY0019701 | 4 PIN,3.0 mm,ETC , ,H=5.8 | | 43 |
| 4 | MCCC00 | CAP,EARPHONE JACK | MCCC0046301 | COMPLEX, (empty), , , , , | Without Color | 46 |
| 4 | MCCF00 | CAP,MOBILE SWITCH | MCCF0044801 | COMPLEX, (empty), , , , , | Without Color | 48 |
| 4 | MCJN00 | COVER,REAR | MCJN0069701 | MOLD, PC LUPOY SC-1004A, , , , , | Without Color | 47 |
| 4 | MLAB00 | LABEL,A/S | MLAB0001102 | C2000 USASV DIA 4.0 | White | |
| 4 | MPBT00 | PAD,CAMERA | MPBT0043501 | COMPLEX, (empty), , , , , | Without Color | 45 |
| 4 | MTAB00 | TAPE,PROTECTION | MTAB0179801 | COMPLEX, (empty), , , , , | Without Color | 49 |
| 4 | MTAK00 | TAPE,CAMERA | MTAK0001901 | COMPLEX, (empty), , , , , | Without Color | 50 |
| 4 | MWAE00 | WINDOW,CAMERA | MWAE0027101 | CUTTING, PMMA RH20 MH21 Flat 001, , , , , | Without Color | 51 |
| 4 | SNGF00 | ANTENNA,GSM,FIXED | SNGF0027801 | 3.0 ,-2.0 dBd, ,EGSM+DCS+PCS+W-BAND I, INTERNAL ,; ,QUAD ,-2.0 ,50 ,3.0 | | 44 |
| 3 | ACGQ00 | COVER ASSY,SLIDE | ACGQ0019301 | | Black | |
| 4 | ABGF00 | BUTTON ASSY,MAIN | ABGF0000201 | | Without Color | 38,H |
| 4 | ABGG00 | BUTTON ASSY,SUB | ABGG0000401 | | Without Color | 12,C |
| 4 | ACGK00 | COVER ASSY,FRONT | ACGK0091801 | | Without Color | G |
| 5 | MCJK00 | COVER,FRONT | MCJK0073401 | MOLD, PC LUPOY HI-1002ML, , , , , | Without Color | |
| 6 | MICA00 | INSERT,FRONT | MICA0019901 | M1.4 D2.2 L1.5 | Gold | |
| 5 | MDAG00 | DECO,FRONT | MDAG0028701 | MOLD, POM LUCEL N109-LD, , , , , | Without Color | 34,37 |
| 5 | MFBD00 | FILTER,MIKE | MFBD0024601 | COMPLEX, (empty), , , , , | Without Color | 39 |
| 5 | MTAA00 | TAPE,DECO | MTAA0139701 | COMPLEX, (empty), , , , , | Without Color | 36 |
| 5 | MTAA01 | TAPE,DECO | MTAA0139601 | COMPLEX, (empty), , , , , | Without Color | 35 |
| 4 | ACGR00 | COVER ASSY,SLIDE(LOWER) | ACGR0011201 | | Without Color | E |
| 5 | MCJV00 | COVER,SLIDE(LOWER) | MCJV0011601 | MOLD, PC LUPOY HI-1002ML, , , , , | Without Color | 25 |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 5 | MGDA00 | GUIDE,LEFT | MGDA0009601 | MOLD, POM LUCEL N109-LD, , , , , | Without Color | 28 |
| 5 | MGDB00 | GUIDE,RIGHT | MGDB0005001 | MOLD, POM LUCEL N109-LD, , , , , | Without Color | 26 |
| 5 | MMAZ00 | MAGNET | MMAZ0004601 | COMPLEX, (empty), , , , , | Without Color | 27 |
| 5 | MPBJ00 | PAD,MOTOR | MPBJ0046301 | COMPLEX, (empty), , , , , | Black | 19 |
| 5 | MPBN00 | PAD,SPEAKER | MPBN0039001 | CUTTING, NS, , , , , | Black | 20 |
| 5 | MPBN01 | PAD,SPEAKER | MPBN0046001 | COMPLEX, (empty), , , , , | Black | |
| 5 | MPBT00 | PAD,CAMERA | MPBT0043601 | COMPLEX, (empty), , , , , | Without Color | 21 |
| 5 | MPBU00 | PAD,CONNECTOR | MPBU0009801 | COMPLEX, (empty), , , , , | Black | 23 |
| 5 | MPBU01 | PAD,CONNECTOR | MPBU0009901 | COMPLEX, (empty), , , , , | Black | 24 |
| 5 | MPBU02 | PAD,CONNECTOR | MPBU0010001 | COMPLEX, (empty), , , , , | Black | 22 |
| 4 | ACGS00 | COVER ASSY,SLIDE(UPPER) | ACGS0013001 | | Without Color | B |
| 5 | MBFF00 | BRACKET,LCD | MBFF0014401 | PRESS, STS, 0.4, , , , | Without Color | 9 |
| 5 | MCJW00 | COVER,SLIDE(UPPER) | MCJW0013801 | MOLD, PC LUPOY SC-1004A, , , , , | Without Color | 4 |
| 6 | MICZ00 | INSERT | MICZ0021601 | M1.4XL2.5 | Silver | 11 |
| 5 | MFBC00 | FILTER,SPEAKER | MFBC0032301 | COMPLEX, (empty), , , , , | Without Color | 6 |
| 5 | MPBG00 | PAD,LCD | MPBG0063401 | COMPLEX, (empty), , , , , | Without Color | 10 |
| 5 | MPBN00 | PAD,SPEAKER | MPBN0038701 | CUTTING, NS, , , , , | Black | 7 |
| 5 | MPBT00 | PAD,CAMERA | MPBT0043401 | COMPLEX, (empty), , , , , | Without Color | 8 |
| 5 | MTAD00 | TAPE,WINDOW | MTAD0070801 | COMPLEX, (empty), , , , , | Without Color | 3 |
| 5 | MTAF00 | TAPE,MOTOR | MTAF0011101 | CUTTING, NS, , , , , | Black | 5 |
| 4 | AHFB00 | HINGE ASSY,SLIDE | AHFB0003103 | 35H37C Black | Black | 33,F |
| 4 | GMEY00 | SCREW MACHINE,BIND | GMEY0011201 | 1.4 mm,3 mm,MSWR3(BK) ,N ,+ ,NYLOK | Without Color | |
| 4 | GMZZ00 | SCREW MACHINE | GMZZ0021901 | 3.0 mm,1.5 mm,SWCH18A ,N ,+ ,- , | Black | 29 |
| 4 | GMZZ01 | SCREW MACHINE | GMZZ0024001 | 1.4 mm,1.5 mm,SWCH18A ,N ,+ ,- , ,; ,CH ,+ ,3.5 ,0.3 ,NYLON ,BLACK ,[empty] ,[empty] | Black | 30,56 |
| 4 | MCCH00 | CAP,SCREW | MCCH0108801 | COMPLEX, (empty), , , , , | Without Color | 31 |
| 4 | MTAB00 | TAPE,PROTECTION | MTAB0179701 | COMPLEX, (empty), , , , , | Without Color | 1 |
| 4 | MWAC00 | WINDOW,LCD | MWAC0081701 | CUTTING, PMMA MR 200, , , , , | Without Color | 2,A |
| 6 | MTAJ00 | TAPE,FLEXIBLE PCB | MTAJ0001101 | COMPLEX, (empty), , , , , | Without Color | 15 |
| 3 | MLAA00 | LABEL,APPROVAL | MLAA0048701 | PRINTING, (empty), , , , , | White | |
| 5 | MCBA00 | CAN,SHIELD | MCBA0020101 | COMPLEX, (empty), 0.3, , , , | Without Color | 42 |
| 5 | MIDZ00 | INSULATOR | MIDZ0144701 | COMPLEX, (empty), , , , , | Black | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 5 | SVCY00 | CAMERA | SVCY0014401 | CMOS ,MEGA ,1.3M, Magnachip(1/4"), 8x8x5t, Socket Type | | 57 |
| 4 | SAFF00 | PCB ASSY,MAIN,SMT | SAFF0140801 | | | |
| 5 | MLAZ00 | LABEL | MLAZ0038301 | PID Label 4 Array | Without Color | |
| 5 | SAFC00 | PCB ASSY,MAIN,SMT BOTTOM | SAFC0096901 | | | |
| 6 | ANT104 | ANTENNA,MOBILE,FIXED | SNMF0028401 | 4:1 ,-5 dB,Pb-free_Chip_Bluetooth ,; ,SINGLE ,-5 ,50 ,4:1 | | |
| 6 | BAT300 | BATTERY,CELL,LITHIUM | SBCL0001701 | 2 V,0.5 mAh,CYLINDER ,Reflow type BB, Max T 1.67, phi 4.8, Pb-Free | | |

## 12.2 Replacement Parts
### <Main component>

**Note:** This Chapter is used for reference, Part order is ordered by SBOM standard on GCSC

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 4 | SACY00 | PCB ASSY,FLEXIBLE | SACY0062201 | | | 17 |
| 5 | SACE00 | PCB ASSY,FLEXIBLE,SMT | SACE0056701 | | | |
| 6 | SACD00 | PCB ASSY,FLEXIBLE,SMT TOP | SACD0046401 | | | |
| 7 | CN100 | CONNECTOR,BOARD TO BOARD | ENBY0022401 | 50 PIN,0.4 mm,ETC , ,H=0.9, Header | | |
| 7 | CN101 | CONNECTOR,BOARD TO BOARD | ENBY0016601 | 20 PIN,0.4 mm,STRAIGHT ,AU ,0.9 STACKING HEIGHT | | |
| 7 | CN102 | CONNECTOR,BOARD TO BOARD | ENBY0022801 | 70 PIN,0.4 mm,ETC , ,H=0.9, Socket | | |
| 6 | SPCY00 | PCB,FLEXIBLE | SPCY0107401 | POLYI ,0.4 mm,DOUBLE , ,; , , , , , , , , , | | |
| 4 | SAJY00 | PCB ASSY,SUB | SAJY0026201 | | | 16,D |
| 5 | SAJB00 | PCB ASSY,SUB,INSERT | SAJB0011901 | | | |
| 6 | ADCA00 | DOME ASSY,METAL | ADCA0068401 | | Without Color | 13 |
| 5 | SAJE00 | PCB ASSY,SUB,SMT | SAJE0020201 | | | |
| 6 | SAJC00 | PCB ASSY,SUB,SMT BOTTOM | SAJC0019201 | | | |
| 7 | C100 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 7 | C101 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 7 | C102 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 7 | C103 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 7 | C104 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 7 | C105 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 7 | C106 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 7 | CN100 | CONNECTOR,BOARD TO BOARD | ENBY0022501 | 50 PIN,0.4 mm,ETC , ,H=0.9, Socket | | |
| 7 | CN101 | CONNECTOR,FFC/FPC | ENQY0010901 | 35 PIN,0.3 mm,ETC , ,H=1.2 | | |
| 7 | D100 | DIODE,SWITCHING | EDSY0011901 | EMD2 ,30 V,1 A,R/TP ,VF=1.5V(IF=200mA) , IR=30uA(VR=10V) | | |
| 7 | D101 | DIODE,TVS | EDTY0008610 | SOD-523 ,5 V,250 W,R/TP ,PB-FREE | | |
| 7 | L100 | INDUCTOR,CHIP | ELCH0003825 | 56 nH,J ,1005 ,R/TP ,chip inductor,PBFREE | | |
| 7 | L101 | INDUCTOR,CHIP | ELCH0003825 | 56 nH,J ,1005 ,R/TP ,chip inductor,PBFREE | | |
| 7 | L102 | INDUCTOR,CHIP | ELCH0003825 | 56 nH,J ,1005 ,R/TP ,chip inductor,PBFREE | | |
| 7 | R100 | RES,CHIP,MAKER | ERHZ0000406 | 100 Kohm,1/16W ,J ,1005 ,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 7 | U100 | IC | EUSY0232812 | SON1612-6 ,6 PIN,R/TP ,2.8V, 150mA LDO | | |
| 7 | U101 | IC | EUSY0238702 | TSOPJW-12 ,12 PIN,R/TP ,3PORT Charge Pump(AAT2154 Low cost version) | | |
| 7 | VA100 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 7 | VA101 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 7 | VA102 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | SAJD00 | PCB ASSY,SUB,SMT TOP | SAJD0021701 | | | |
| 7 | LD100 | DIODE,LED,CHIP | EDLH0006001 | Blue ,1608 ,R/TP ,Blue SMD LED | | |
| 7 | LD101 | DIODE,LED,CHIP | EDLH0006001 | Blue ,1608 ,R/TP ,Blue SMD LED | | |
| 7 | LD102 | DIODE,LED,CHIP | EDLH0006001 | Blue ,1608 ,R/TP ,Blue SMD LED | | |
| 7 | LD103 | DIODE,LED,CHIP | EDLH0006001 | Blue ,1608 ,R/TP ,Blue SMD LED | | |
| 7 | LD104 | DIODE,LED,CHIP | EDLH0006001 | Blue ,1608 ,R/TP ,Blue SMD LED | | |
| 7 | LD105 | DIODE,LED,CHIP | EDLH0006001 | Blue ,1608 ,R/TP ,Blue SMD LED | | |
| 7 | LD106 | DIODE,LED,CHIP | EDLH0006001 | Blue ,1608 ,R/TP ,Blue SMD LED | | |
| 7 | LD107 | DIODE,LED,CHIP | EDLH0006001 | Blue ,1608 ,R/TP ,Blue SMD LED | | |
| 7 | Q100 | TR,BJT,NPN | EQBN0014901 | SOT323 ,.2 W,R/TP ,NPN SWITCHING TR, Pb free | | |
| 7 | R101 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | R102 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | R103 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | R104 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | R105 | RES,CHIP,MAKER | ERHZ0000485 | 4700 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | R130 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | R131 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | R132 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | R133 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 7 | VA103 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 7 | VA104 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 7 | VA105 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 7 | VA106 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 7 | VA107 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 7 | VA108 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 7 | VA109 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 7 | VA110 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | SPJY00 | PCB,SUB | SPJY0045701 | FR-4 ,0.4 mm,BUILD-UP 4 | | |
| 4 | SJMY00 | VIBRATOR,MOTOR | SJMY0006506 | 3 V,0.08 A,10*3.45 ,17mm | | 18 |
| 4 | SUSY00 | SPEAKER | SUSY0026801 | ASSY ,8 ohm,88 dB, mm,wire 15mm ,; , , , , , ,18*10*3T ,WIRE | | 54 |
| 4 | SVCY00 | CAMERA | SVCY0015301 | CMOS ,VGA ,MAGNACHIP(1/7.4"), 5.5x5.1x3.2t, FPCB 90 | | 55 |
| 4 | SVLM00 | LCD MODULE | SVLM0026001 | MAIN ,176*220 (1.76") ,34*46.7*2.5(T) ,262k ,TFT ,TM ,HX8340(Himax) ,FPCB Change | | 14 |
| 3 | GMEY00 | SCREW MACHINE,BIND | GMEY0011201 | 1.4 mm,3 mm,MSWR3(BK) ,N ,+ ,NYLOK | Without Color | |
| 3 | SAFY00 | PCB ASSY,MAIN | SAFY0219701 | | | 41,I |
| 4 | SAFB00 | PCB ASSY,MAIN,INSERT | SAFB0076401 | | | |
| 5 | ADCA00 | DOME ASSY,METAL | ADCA0068501 | | Without Color | 40 |
| 6 | C101 | CAP,CHIP,MAKER | ECZH0000822 | 1.5 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C102 | CAP,CERAMIC,CHIP | ECCH0001002 | 180 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C103 | CAP,CERAMIC,CHIP | ECCH0001002 | 180 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C109 | CAP,CERAMIC,CHIP | ECCH0001002 | 180 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C112 | CAP,CERAMIC,CHIP | ECCH0001002 | 180 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C113 | CAP,CERAMIC,CHIP | ECCH0000149 | 3.3 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C114 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C118 | CAP,CHIP,MAKER | ECZH0000816 | 12 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C119 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C121 | CAP,CERAMIC,CHIP | ECCH0000393 | 22 uF,6.3V ,M ,X5R ,HD ,2012 ,R/TP | | |
| 6 | C123 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C124 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C125 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C126 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C127 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C128 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C129 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C130 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C135 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C137 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C138 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | C139 | CAP,CHIP,MAKER | ECZH0000813 | 100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C140 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C141 | CAP,CERAMIC,CHIP | ECCH0000393 | 22 uF,6.3V ,M ,X5R ,HD ,2012 ,R/TP | | |
| 6 | C142 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C145 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C146 | CAP,CERAMIC,CHIP | ECCH0000115 | 22 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C147 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C150 | CAP,CHIP,MAKER | ECZH0000813 | 100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C153 | CAP,CERAMIC,CHIP | ECCH0000901 | 2.2 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C156 | CAP,CERAMIC,CHIP | ECCH0000901 | 2.2 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C159 | CAP,CHIP,MAKER | ECZH0000813 | 100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C160 | CAP,CERAMIC,CHIP | ECCH0000901 | 2.2 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C163 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C164 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C165 | CAP,CERAMIC,CHIP | ECCH0000198 | 2.2 uF,6.3V ,M ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C166 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C167 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C168 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C169 | CAP,CHIP,MAKER | ECZH0000813 | 100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C170 | CAP,CHIP,MAKER | ECZH0000813 | 100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C171 | CAP,CERAMIC,CHIP | ECCH0005602 | 2.2 uF,16V ,K ,X5R ,HD ,1608 ,R/TP | | |
| 6 | C172 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C173 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C174 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C175 | CAP,CHIP,MAKER | ECZH0000813 | 100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C176 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C177 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C178 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C200 | CAP,CERAMIC,CHIP | ECCH0000122 | 47 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C201 | CAP,CERAMIC,CHIP | ECCH0000122 | 47 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C202 | CAP,CHIP,MAKER | ECZH0001211 | 220 nF,10V ,Z ,Y5V ,HD ,1005 ,R/TP | | |
| 6 | C203 | CAP,CHIP,MAKER | ECZH0001211 | 220 nF,10V ,Z ,Y5V ,HD ,1005 ,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | C204 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C205 | CAP,TANTAL,CHIP,MAKER | ECTZ0004701 | 4.7 uF,6.3V ,M ,STD ,1608 ,R/TP | | |
| 6 | C206 | CAP,TANTAL,CHIP | ECTH0003701 | 10 uF,6.3V ,M ,L_ESR ,1608 ,R/TP | | |
| 6 | C207 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C208 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C209 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C210 | CAP,CERAMIC,CHIP | ECCH0000179 | 22 nF,16V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C211 | CAP,CERAMIC,CHIP | ECCH0000179 | 22 nF,16V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C212 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C213 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C214 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C215 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C216 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C217 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C218 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C219 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C220 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C221 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C222 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C223 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C224 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C225 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C226 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C227 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C228 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C229 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C230 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C231 | CAP,CERAMIC,CHIP | ECCH0000147 | 2.2 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C234 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C235 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C236 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C237 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|-------|--------------|-------------|-------------|------|-------|--------|
| 6 | C238 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C239 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C240 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C241 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C242 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C243 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C244 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C245 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C246 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C248 | CAP,CERAMIC,CHIP | ECCH0000161 | 33 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C249 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C300 | CAP,TANTAL,CHIP | ECTH0002002 | 33 uF,10V ,M ,L_ESR ,2012 ,R/TP ,; , ,[empty] ,[empty] , ,-55TO+125C , ,2.2X1.1X1.1MM ,[empty] ,[empty] ,[empty] | | |
| 6 | C301 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C302 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C303 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C304 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C305 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C306 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C307 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C308 | CAP,TANTAL,CHIP | ECTH0002202 | 4.7 uF,10V ,M ,STD ,1608 ,R/TP | | |
| 6 | C309 | CAP,TANTAL,CHIP | ECTH0002202 | 4.7 uF,10V ,M ,STD ,1608 ,R/TP | | |
| 6 | C310 | CAP,TANTAL,CHIP | ECTH0002202 | 4.7 uF,10V ,M ,STD ,1608 ,R/TP | | |
| 6 | C311 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C312 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C313 | CAP,CERAMIC,CHIP | ECCH0005602 | 2.2 uF,16V ,K ,X5R ,HD ,1608 ,R/TP | | |
| 6 | C314 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C315 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C316 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C317 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C318 | CAP,CHIP,MAKER | ECZH0001215 | 1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C319 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|-------|-------------|-------------|-------------|------|-------|--------|
| 6 | C320 | CAP,CERAMIC,CHIP | ECCH0006201 | 4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP | | |
| 6 | C321 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C322 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C323 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C324 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C325 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C326 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C327 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C328 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C329 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C330 | CAP,CERAMIC,CHIP | ECCH0006201 | 4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP | | |
| 6 | C331 | CAP,CERAMIC,CHIP | ECCH0006201 | 4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP | | |
| 6 | C332 | CAP,CHIP,MAKER | ECZH0000830 | 33 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C333 | CAP,CHIP,MAKER | ECZH0000830 | 33 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C334 | CAP,CERAMIC,CHIP | ECCH0005602 | 2.2 uF,16V ,K ,X5R ,HD ,1608 ,R/TP | | |
| 6 | C335 | CAP,CERAMIC,CHIP | ECCH0005602 | 2.2 uF,16V ,K ,X5R ,HD ,1608 ,R/TP | | |
| 6 | C336 | CAP,TANTAL,CHIP | ECTH0001903 | 22 uF,6.3V ,M ,L_ESR ,1608 ,R/TP | | |
| 6 | C337 | CAP,CERAMIC,CHIP | ECCH0006201 | 4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP | | |
| 6 | C338 | CAP,CERAMIC,CHIP | ECCH0006201 | 4.7 uF,6.3V ,K ,X5R ,TC ,1608 ,R/TP | | |
| 6 | C339 | CAP,CERAMIC,CHIP | ECCH0005604 | 10 uF,6.3V ,M ,X5R ,TC ,1608 ,R/TP | | |
| 6 | C340 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C341 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C342 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C343 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C347 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C350 | CAP,CHIP,MAKER | ECZH0000830 | 33 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C351 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C400 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C401 | CAP,TANTAL,CHIP | ECTH0004402 | 33 uF,6.3V ,M ,L_ESR ,2012 ,R/TP | | |
| 6 | C402 | CAP,TANTAL,CHIP | ECTH0004402 | 33 uF,6.3V ,M ,L_ESR ,2012 ,R/TP | | |
| 6 | C403 | CAP,CERAMIC,CHIP | ECCH0002002 | 47000 pF,10V ,K ,B ,HD ,1005 ,R/TP | | |
| 6 | C404 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | C405 | CAP,TANTAL,CHIP | ECTH0002002 | 33 uF,10V ,M ,L_ESR ,2012 ,R/TP ,; , ,[empty] ,[empty] , ,-55TO+125C , ,2.2X1.1X1.1MM ,[empty] ,[empty] ,[empty] | | |
| 6 | C406 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C407 | CAP,CHIP,MAKER | ECZH0001215 | 1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C408 | CAP,CERAMIC,CHIP | ECCH0000122 | 47 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C409 | CAP,CERAMIC,CHIP | ECCH0000122 | 47 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C410 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C411 | CAP,CERAMIC,CHIP | ECCH0000120 | 39 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C412 | CAP,CERAMIC,CHIP | ECCH0000137 | 330 pF,50V ,K ,X7R ,HD ,1005 ,R/TP | | |
| 6 | C415 | CAP,CERAMIC,CHIP | ECCH0000155 | 10 nF,16V,K,X7R,HD,1005,R/TP | | |
| 6 | C418 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C421 | CAP,TANTAL,CHIP | ECTH0003701 | 10 uF,6.3V ,M ,L_ESR ,1608 ,R/TP | | |
| 6 | C422 | CAP,CERAMIC,CHIP | ECCH0000122 | 47 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C423 | CAP,CERAMIC,CHIP | ECCH0000179 | 22 nF,16V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C424 | CAP,CERAMIC,CHIP | ECCH0000179 | 22 nF,16V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C425 | CAP,CERAMIC,CHIP | ECCH0000120 | 39 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C426 | CAP,CERAMIC,CHIP | ECCH0000120 | 39 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C427 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C428 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C429 | CAP,TANTAL,CHIP | ECTH0001902 | 10 uF,10V ,M ,L_ESR ,1608 ,R/TP | | |
| 6 | C430 | CAP,CERAMIC,CHIP | ECCH0000152 | 5.6 nF,25V,K,X7R,HD,1005,R/TP | | |
| 6 | C431 | CAP,CERAMIC,CHIP | ECCH0000152 | 5.6 nF,25V,K,X7R,HD,1005,R/TP | | |
| 6 | C432 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C433 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | C434 | CAP,CERAMIC,CHIP | ECCH0000143 | 1 nF,50V,K,X7R,HD,1005,R/TP | | |
| 6 | CN400 | CONNECTOR,I/O | ENRY0006401 | 18 PIN,0.4 mm,ANGLE , ,H=2.5, Reverse Type | | |
| 6 | CN403 | CONN,SOCKET | ENSY0020101 | 24 PIN,ETC , ,0.9 mm, | | |
| 6 | D300 | DIODE,SWITCHING | EDSY0011901 | EMD2 ,30 V,1 A,R/TP , VF=1.5V(IF=200mA) , IR=30uA(VR=10V) | | |
| 6 | D400 | DIODE,TVS | EDTY0008601 | SOD-323 ,6 V,400 W,R/TP ,PB-FREE | | |
| 6 | D401 | DIODE,TVS | EDTY0007401 | SMD ,12 V,350 W,R/TP , | | |
| 6 | D402 | DIODE,TVS | EDTY0008601 | SOD-323 ,6 V,400 W,R/TP ,PB-FREE | | |
| 6 | D403 | DIODE,TVS | EDTY0008601 | SOD-323 ,6 V,400 W,R/TP ,PB-FREE | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | FL103 | FILTER,SAW | SFSY0031201 | 2140 MHz,1.4*1.1*0.62 ,SMD ,2110M~2170M, IL 2.0, 5pin, U-B, 50-100_10, WCDMA BAND I Rx ,; ,2140 ,1.4*1.1*0.62 ,SMD ,R/TP | | |
| 6 | FL405 | FILTER,EMI/POWER | SFEY0006001 | SMD , | | |
| 6 | FL406 | FILTER,EMI/POWER | SFEY0010401 | SMD ,4ch, 18V, 15pF, 50ohm  Pb-free | | |
| 6 | FL407 | FILTER,EMI/POWER | SFEY0010401 | SMD ,4ch, 18V, 15pF, 50ohm  Pb-free | | |
| 6 | FL408 | FILTER,EMI/POWER | SFEY0010401 | SMD ,4ch, 18V, 15pF, 50ohm  Pb-free | | |
| 6 | J300 | CONN,SOCKET | ENSY0019201 | 8 PIN,ETC ,8Pin ,2.54 mm,Korean 8Pin Stopper UIM | | |
| 6 | J301 | CONN,SOCKET | ENSY0017701 | 8 PIN,ETC , , mm,Micro-SD, Hinge type | | |
| 6 | L100 | INDUCTOR,CHIP | ELCH0005010 | 1.8 nH,S ,1005 ,R/TP , | | |
| 6 | L101 | INDUCTOR,CHIP | ELCH0004709 | 3.3 nH,S ,1005 ,R/TP , | | |
| 6 | L102 | INDUCTOR,CHIP | ELCH0004710 | 15 nH,J ,1005 ,R/TP , | | |
| 6 | L114 | INDUCTOR,CHIP | ELCH0003813 | 47 nH,J ,1005 ,R/TP ,COIL TYPE | | |
| 6 | L118 | INDUCTOR,CHIP | ELCH0003813 | 47 nH,J ,1005 ,R/TP ,COIL TYPE | | |
| 6 | L119 | INDUCTOR,CHIP | ELCH0003813 | 47 nH,J ,1005 ,R/TP ,COIL TYPE | | |
| 6 | L120 | INDUCTOR,CHIP | ELCH0005020 | 1 nH,S ,1005 ,R/TP , | | |
| 6 | L124 | INDUCTOR,CHIP | ELCH0001035 | 4.7 nH,S ,1005 ,R/TP ,PBFREE | | |
| 6 | L125 | INDUCTOR,CHIP | ELCH0001035 | 4.7 nH,S ,1005 ,R/TP ,PBFREE | | |
| 6 | L129 | INDUCTOR,CHIP | ELCH0001035 | 4.7 nH,S ,1005 ,R/TP ,PBFREE | | |
| 6 | L130 | INDUCTOR,CHIP | ELCH0001041 | 10 nH,S ,1005 ,R/TP ,PBFREE | | |
| 6 | L131 | INDUCTOR,CHIP | ELCH0004721 | 2.2 nH,S ,1005 ,R/TP , | | |
| 6 | L132 | INDUCTOR,CHIP | ELCH0004708 | 2.7 nH,S ,1005 ,R/TP , | | |
| 6 | L300 | INDUCTOR,SMD,POWER | ELCP0008001 | 4.7 uH,M ,2.5*2.0*1.0 ,R/TP , | | |
| 6 | L301 | INDUCTOR,SMD,POWER | ELCP0008001 | 4.7 uH,M ,2.5*2.0*1.0 ,R/TP , | | |
| 6 | L302 | INDUCTOR,SMD,POWER | ELCP0008001 | 4.7 uH,M ,2.5*2.0*1.0 ,R/TP , | | |
| 6 | L303 | INDUCTOR,CHIP | ELCH0001550 | 56 nH,J ,1608 ,R/TP , | | |
| 6 | M100 | MODULE,ETC | SMZY0012601 | 4.5x3.2x1.2 Bluetooth RF Module | | |
| 6 | MIC400 | MICROPHONE | SUMY0010602 | UNIT ,-42 dB,6.15*3.76*1.25 ,Silicon mic , ,-42 ,300 ,OMNI ,[empty] ,6.15*3.76*1.25 ,SMD | | |
| 6 | R104 | RES,CHIP,MAKER | ERHZ0000212 | 12 Kohm,1/16W ,F ,1005 ,R/TP | | |
| 6 | R105 | RES,CHIP,MAKER | ERHZ0000310 | 680 ohm,1/16W ,F ,1005 ,R/TP | | |
| 6 | R106 | RES,CHIP,MAKER | ERHZ0003801 | 5.1 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R107 | RES,CHIP | ERHY0013101 | 2.7 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R108 | RES,CHIP | ERHY0013101 | 2.7 ohm,1/16W ,J ,1005 ,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | R109 | RES,CHIP,MAKER | ERHZ0003801 | 5.1 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R114 | RES,CHIP,MAKER | ERHZ0000402 | 10 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R120 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R126 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R127 | RES,CHIP,MAKER | ERHZ0000406 | 100 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R200 | RES,CHIP,MAKER | ERHZ0000222 | 150 Kohm,1/16W,F ,1005 ,R/TP | | |
| 6 | R201 | RES,CHIP,MAKER | ERHZ0000469 | 36 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R202 | RES,CHIP | ERHY0000196 | 300 Kohm,1/16W,F ,1005 ,R/TP | | |
| 6 | R203 | RES,CHIP,MAKER | ERHZ0000493 | 51 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R204 | RES,CHIP,MAKER | ERHZ0000493 | 51 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R206 | RES,CHIP,MAKER | ERHZ0000490 | 51 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R207 | RES,CHIP,MAKER | ERHZ0000493 | 51 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R208 | RES,CHIP,MAKER | ERHZ0000493 | 51 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R212 | RES,CHIP,MAKER | ERHZ0000437 | 2 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R213 | RES,CHIP,MAKER | ERHZ0000443 | 2200 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R214 | RES,CHIP,MAKER | ERHZ0000443 | 2200 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R300 | RES,CHIP,MAKER | ERHZ0000406 | 100 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R301 | RES,CHIP,MAKER | ERHZ0000443 | 2200 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R302 | RES,CHIP,MAKER | ERHZ0000406 | 100 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R303 | RES,CHIP,MAKER | ERHZ0004201 | 121000 ohm,1/16W,F ,1005 ,R/TP | | |
| 6 | R304 | RES,CHIP,MAKER | ERHZ0000487 | 470 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R305 | RES,CHIP,MAKER | ERHZ0000203 | 10 Kohm,1/16W,F ,1005 ,R/TP | | |
| 6 | R306 | RES,CHIP,MAKER | ERHZ0000490 | 51 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R307 | RES,CHIP,MAKER | ERHZ0000493 | 51 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R308 | RES,CHIP,MAKER | ERHZ0000493 | 51 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R309 | RES,CHIP,MAKER | ERHZ0000443 | 2200 ohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R310 | RES,CHIP,MAKER | ERHZ0000405 | 10 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R315 | RES,CHIP,MAKER | ERHZ0000406 | 100 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R316 | RES,CHIP,MAKER | ERHZ0000406 | 100 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R317 | RES,CHIP,MAKER | ERHZ0000422 | 15 Kohm,1/16W,J ,1005 ,R/TP | | |
| 6 | R319 | RES,CHIP,MAKER | ERHZ0004301 | 0.1 ohm,1/4W ,F ,ETC ,R/TP | | |
| 6 | R320 | RES,CHIP,MAKER | ERHZ0000487 | 470 Kohm,1/16W,J ,1005 ,R/TP | | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | R400 | RES,CHIP,MAKER | ERHZ0000443 | 2200 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R401 | RES,CHIP,MAKER | ERHZ0000530 | 5.1 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R402 | RES,CHIP,MAKER | ERHZ0000407 | 1000 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R403 | RES,CHIP,MAKER | ERHZ0000295 | 51 Kohm,1/16W ,F ,1005 ,R/TP | | |
| 6 | R404 | RES,CHIP,MAKER | ERHZ0000405 | 10 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R405 | RES,CHIP,MAKER | ERHZ0000406 | 100 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R406 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R407 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R408 | RES,CHIP,MAKER | ERHZ0000288 | 470 Kohm,1/16W ,F ,1005 ,R/TP | | |
| 6 | R409 | RES,CHIP,MAKER | ERHZ0000537 | 680000 ohm,1/16W ,F ,1005 ,R/TP | | |
| 6 | R410 | RES,CHIP,MAKER | ERHZ0000318 | 80.6 Kohm,1/16W ,F ,1005 ,R/TP | | |
| 6 | R413 | RES,CHIP,MAKER | ERHZ0000473 | 39 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R414 | RES,CHIP,MAKER | ERHZ0000473 | 39 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R416 | RES,CHIP,MAKER | ERHZ0000443 | 2200 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R417 | RES,CHIP,MAKER | ERHZ0000438 | 20 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R418 | RES,CHIP,MAKER | ERHZ0000404 | 1 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R419 | RES,CHIP,MAKER | ERHZ0000499 | 5600 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R420 | RES,CHIP,MAKER | ERHZ0000404 | 1 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R421 | RES,CHIP,MAKER | ERHZ0000499 | 5600 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R422 | RES,CHIP,MAKER | ERHZ0000438 | 20 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | SW100 | CONN,RF SWITCH | ENWY0003301 | ,SMD ,0.4 dB, | | |
| 6 | U101 | IC | EUSY0300501 | QFN ,56 PIN,R/TP ,GSM,  WCDMA Single RF Transceiver, 8X8X0.9 | | |
| 6 | U105 | IC | EUSY0073401 | SSOP5-P-0.65A ,5 PIN,R/TP ,INVERTER, Pb Free | | |
| 6 | U200 | IC | EUSY0318401 | CSP ,409 PIN,R/TP ,WEDGE Baseband Platform | | |
| 6 | U300 | IC | EUSY0306302 | BCCS ,84 PIN,R/TP ,7x7, MSMC(1.2V), pbfree | | |
| 6 | U301 | IC | EUSY0336902 | FBGA ,225 PIN,ETC ,1G(LB/64Mx16/2.7V) NAND+512(4Mx32x4) SDRAM ,; ,IC,MCP | | |
| 6 | U304 | IC | EUSY0332901 | WDFN ,8 PIN,R/TP ,-12V, 6.3A, Single P-MOSFET & DUAL Transistor | | |
| 6 | U400 | IC | EUSY0250501 | SC70 ,5 PIN,R/TP ,Comparator, pin compatible to EUSY0077701 | | |
| 6 | U401 | IC | EUSY0300101 | WQFN ,10 PIN,R/TP ,Small package Dual SPDT analog Switch, PB-Free | | |
| 6 | U402 | IC | EUSY0176401 | MICRO8 ,8 PIN,R/TP ,1W AUDIO AMPLIFIER | | |
| 6 | VA300 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | VA301 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA302 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA303 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA304 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA305 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA306 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA307 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA308 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA309 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA310 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA311 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA400 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA401 | VARISTOR | SEVY0004001 | 18 V, ,SMD ,3pF, 1005 | | |
| 6 | VA402 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA403 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA404 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA405 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA406 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA407 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA408 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA409 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA415 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA416 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | X100 | VCTCXO | EXSK0005703 | 19.2 MHz,1.5 PPM,40 pF,SMD ,3.2*2.5*0.9 , ,; , ,1.5PPM ,2.8V ,3.2 ,2.5 ,0.9 , ,SMD ,P/TP | | |
| 6 | X300 | X-TAL | EXXY0004601 | .032768 MHz,20 PPM,7 pF,65000 ohm,SMD ,6.9*1.4*1.3 , | | |
| 5 | SAFD00 | PCB ASSY,MAIN,SMT TOP | SAFD0096101 | | | |
| 6 | C100 | CAP,CHIP,MAKER | ECZH0000841 | 56 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C107 | CAP,CHIP,MAKER | ECZH0000846 | 8.2 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C108 | CAP,CERAMIC,CHIP | ECCH0000107 | 6 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C110 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C111 | CAP,CHIP,MAKER | ECZH0000816 | 12 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | C115 | CAP,CERAMIC,CHIP | ECCH0000101 | .5 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C116 | CAP,CHIP,MAKER | ECZH0000830 | 33 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C117 | CAP,CHIP,MAKER | ECZH0000830 | 33 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C120 | CAP,CERAMIC,CHIP | ECCH0000101 | .5 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C122 | CAP,CHIP,MAKER | ECZH0000846 | 8.2 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C131 | CAP,CHIP,MAKER | ECZH0000844 | 68 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C132 | CAP,TANTAL,CHIP | ECTH0002002 | 33 uF,10V ,M ,L_ESR ,2012 ,R/TP ,; , ,[empty] ,[empty] , ,-55TO+125C , ,2.2X1.1X1.1MM ,[empty] ,[empty] ,[empty] | | |
| 6 | C136 | CAP,CHIP,MAKER | ECZH0000830 | 33 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C143 | CAP,CERAMIC,CHIP | ECCH0000112 | 15 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C144 | CAP,CERAMIC,CHIP | ECCH0000112 | 15 pF,50V,J,NP0,TC,1005,R/TP | | |
| 6 | C148 | CAP,CHIP,MAKER | ECZH0000846 | 8.2 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C149 | CAP,TANTAL,CHIP | ECTH0002202 | 4.7 uF,10V ,M ,STD ,1608 ,R/TP | | |
| 6 | C151 | CAP,CHIP,MAKER | ECZH0001215 | 1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C152 | CAP,CHIP,MAKER | ECZH0001215 | 1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C154 | CAP,CERAMIC,CHIP | ECCH0000195 | 3.9 pF,50V ,C ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C155 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C158 | CAP,CHIP,MAKER | ECZH0000813 | 100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C162 | CAP,CHIP,MAKER | ECZH0000813 | 100 pF,50V ,J ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C232 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C233 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C344 | CAP,CHIP,MAKER | ECZH0001215 | 1 uF,10V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C345 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C346 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C348 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C349 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C413 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C414 | CAP,CERAMIC,CHIP | ECCH0000182 | 0.1 uF,10V ,K ,X5R ,HD ,1005 ,R/TP | | |
| 6 | C416 | CAP,CHIP,MAKER | ECZH0004402 | 0.1 uF,16V ,Z ,NP0 ,TC ,1005 ,R/TP | | |
| 6 | C417 | CAP,CERAMIC,CHIP | ECCH0004904 | 1 uF,6.3V ,K ,X5R ,TC ,1005 ,R/TP | | |
| 6 | C419 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |
| 6 | C420 | CAP,CERAMIC,CHIP | ECCH0000110 | 10 pF,50V,D,NP0,TC,1005,R/TP | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | CN402 | CONNECTOR,BOARD TO BOARD | ENBY0022901 | 70 PIN,0.4 mm,ETC , ,H=0.9, Plug | | |
| 6 | FL100 | FILTER,SAW | SFSY0030201 | 897.5 MHz,1.4*1.1*0.6 ,SMD ,Pb-free_SAW_GSM900_Tx | | |
| 6 | FL101 | FILTER,SAW | SFSY0031101 | 1950 MHz,1.4*1.1*0.62 ,SMD ,RF Filter for WCDMA 2Ghz ,; ,1950 ,1.4*1.1*0.62 ,SMD ,P/TR | | |
| 6 | FL102 | DUPLEXER,IMT | SDMY0001301 | 1950 MHz,2140 MHz,1.6 dB,2.0 dB,53 dB,44 dB,3.0*2.5*1.2 ,SMD ,FBAR, WCDMA duplexer ,; ,2140 ,44 ,1950 ,53 ,2.0 ,1.6 ,3.0X2.5X1.2 ,DUAL ,SMD ,R/TP | | |
| 6 | FL400 | FILTER,EMI/POWER | SFEY0010401 | SMD ,4ch, 18V, 15pF, 50ohm Pb-free | | |
| 6 | FL401 | FILTER,EMI/POWER | SFEY0010401 | SMD ,4ch, 18V, 15pF, 50ohm Pb-free | | |
| 6 | FL402 | FILTER,EMI/POWER | SFEY0010401 | SMD ,4ch, 18V, 15pF, 50ohm Pb-free | | |
| 6 | FL403 | FILTER,EMI/POWER | SFEY0010401 | SMD ,4ch, 18V, 15pF, 50ohm Pb-free | | |
| 6 | FL404 | FILTER,EMI/POWER | SFEY0010401 | SMD ,4ch, 18V, 15pF, 50ohm Pb-free | | |
| 6 | L103 | INDUCTOR,CHIP | ELCH0005009 | 100 nH,J ,1005 ,R/TP , | | |
| 6 | L104 | INDUCTOR,CHIP | ELCH0004721 | 2.2 nH,S ,1005 ,R/TP , | | |
| 6 | L105 | INDUCTOR,CHIP | ELCH0004721 | 2.2 nH,S ,1005 ,R/TP , | | |
| 6 | L106 | INDUCTOR,CHIP | ELCH0003817 | 7.5 nH,J ,1005 ,R/TP , | | |
| 6 | L107 | INDUCTOR,CHIP | ELCH0004721 | 2.2 nH,S ,1005 ,R/TP , | | |
| 6 | L108 | INDUCTOR,CHIP | ELCH0004721 | 2.2 nH,S ,1005 ,R/TP , | | |
| 6 | L109 | INDUCTOR,CHIP | ELCH0001057 | 3.9 nH,S ,1005 ,R/TP ,PBFREE | | |
| 6 | L110 | INDUCTOR,CHIP | ELCH0004721 | 2.2 nH,S ,1005 ,R/TP , | | |
| 6 | L111 | INDUCTOR,CHIP | ELCH0004701 | 12 nH,J ,1005 ,R/TP , | | |
| 6 | L112 | INDUCTOR,CHIP | ELCH0004701 | 12 nH,J ,1005 ,R/TP , | | |
| 6 | L113 | INDUCTOR,CHIP | ELCH0004701 | 12 nH,J ,1005 ,R/TP , | | |
| 6 | L115 | INDUCTOR,CHIP | ELCH0001032 | 18 nH,J ,1005 ,R/TP ,PBFREE | | |
| 6 | L116 | INDUCTOR,CHIP | ELCH0004705 | 8.2 nH,J ,1005 ,R/TP , | | |
| 6 | L117 | INDUCTOR,CHIP | ELCH0004707 | 1.5 nH,S ,1005 ,R/TP , | | |
| 6 | L121 | INDUCTOR,CHIP | ELCH0004718 | 5.6 nH,S ,1005 ,R/TP , | | |
| 6 | L123 | INDUCTOR,CHIP | ELCH0005010 | 1.8 nH,S ,1005 ,R/TP , | | |
| 6 | L126 | INDUCTOR,CHIP | ELCH0004701 | 12 nH,J ,1005 ,R/TP , | | |
| 6 | L127 | INDUCTOR,CHIP | ELCH0001401 | 15 nH,J ,1005 ,R/TP ,Pb Free | | |
| 6 | LD400 | DIODE,LED,CHIP | EDLH0013405 | white ,ETC ,R/TP ,3.8x1.05x0.6t ,; ,[empty] ,3.0~3.7v , , , , ,[empty] ,[empty] ,[empty] | | |
| 6 | R102 | RES,CHIP,MAKER | ERHZ0000404 | 1 Kohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R103 | RES,CHIP,MAKER | ERHZ0000404 | 1 Kohm,1/16W ,J ,1005 ,R/TP | | |

LGE Internal Use Only

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|-------|--------------|-------------|-------------|------|-------|--------|
| 6 | R110 | RES,CHIP,MAKER | ERHZ0000443 | 2200 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R111 | RES,CHIP,MAKER | ERHZ0000504 | 68 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R112 | RES,CHIP,MAKER | ERHZ0000517 | 91 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R113 | RES,CHIP,MAKER | ERHZ0000517 | 91 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R115 | RES,CHIP | ERHY0000179 | 39 ohm,1/16W ,F ,1005 ,R/TP | | |
| 6 | R116 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R117 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R118 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R119 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R121 | RES,CHIP,MAKER | ERHZ0000490 | 51 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R122 | RES,CHIP,MAKER | ERHZ0000483 | 47 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R123 | RES,CHIP,MAKER | ERHZ0000415 | 130 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R124 | RES,CHIP,MAKER | ERHZ0000415 | 130 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R209 | RES,CHIP,MAKER | ERHZ0000483 | 47 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R318 | RES,CHIP,MAKER | ERHZ0000204 | 100 Kohm,1/16W ,F ,1005 ,R/TP | | |
| 6 | R411 | RES,CHIP | ERHY0003301 | 100 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | R412 | RES,CHIP,MAKER | ERHZ0000483 | 47 ohm,1/16W ,J ,1005 ,R/TP | | |
| 6 | RA400 | RES,ARRAY,R | ERNR0000404 | 100 Kohm,100 Kohm,8 PIN,J ,1/16W ,SMD ,R/TP | | |
| 6 | SPFY00 | PCB,MAIN | SPFY0157401 | FR-4 ,0.8 mm,3-6Staggerd,8Layer | | |
| 6 | TR100 | TR,BJT,ARRAY | EQBA0000601 | UMT5 ,.2 W,R/TP , | | |
| 6 | U100 | FILTER,SEPERATOR | SFAY0007402 | 900.1800 ,1900.2100 , dB, dB, dB, dB,ETC ,1800GSM Quad, WCDMA2100 FEM, 5.4X4.0X1.2, Improved D5006 | | |
| 6 | U102 | PAM | SMPY0014801 | 34.5 dBm,55 %, A, dBc, dB,6x8x1.2 ,SMD ,Edge PAM for QCT ,; , , , , , , , ,SMD ,R/TP ,16 | | |
| 6 | U103 | COUPLER,RF DIRECTIONAL | SCDY0003403 | -18 dB,-.25 dB,-33 dB,1.0*0.58*0.35 ,SMD ,1920M ~ 1980M, 4pin, Pb Free , ,[empty] , , ,SMD ,R/TP | | |
| 6 | U104 | PAM | SMPY0013301 | dBm,43 %, A,-40 dBc,26 dB,4x4x1.1 ,SMD ,2.1GHz, HSDPA | | |
| 6 | U302 | IC | EUSY0319001 | WDFN-8L ,8 PIN,R/TP ,300mA/300mA 2.8V/1.8V Dual LDO | | |
| 6 | U303 | IC | EUSY0129503 | 2x2 mm MLPD ,3 PIN,R/TP ,Hall Effect Switch, Pb Free | | |
| 6 | VA410 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA411 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA412 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA413 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|---|---|---|---|---|---|---|
| 6 | VA414 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA417 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA418 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA419 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA420 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA421 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA422 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA423 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA424 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA425 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA426 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA427 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |
| 6 | VA428 | VARISTOR | SEVY0000702 | 14 V,10% ,SMD , | | |

# 12. EXPLODED VIEW & REPLACEMENT PART LIST

## 12.3 Accessory

| Level | Location No. | Description | Part Number | Spec | Color | Remark |
|-------|--------------|-------------|-------------|------|-------|--------|
| 3 | MCJA00 | COVER,BATTERY | MCJA0046501 | MOLD, PC LUPOY SC-1004A, , , , , | Without Color | 53,K |
| 3 | SBPL00 | BATTERY PACK,LI-ION | SBPL0089902 | 3.7 V,900 mAh,1 CELL,PRISMATIC ,KU380 Europe IP BATT, Pb-Free ,; ,3.7V ,900mAh ,0.2C ,PRISMATIC ,50x34x46 , ,BLACK ,Innerpack ,Europe Label | Black | 52 |
| 3 | SGEY00 | EAR PHONE/EAR MIKE SET | SGEY0003210 | ; ,10mW ,16 OHM ,105dB ,10KHZ ,450HZ ,[empty] ,BLACK,EARPHONE HOUSING:SILVER ,18P MMI CONNECTOR ,LOW COST STEREO,18P(5P) | | |
| 3 | SSAD00 | ADAPTOR,AC-DC | SSAD0021002 | 100-240V ,5060 Hz,4.8 V,0.9 A,CB & CE ,18pin plug | | |
| | | ADAPTOR,AC-DC | SSAD0021001 | 100-240V ,5060 Hz,4.8 V,0.9 A,CB & CE ,18pin plug | | |
| | | ADAPTOR,AC-DC | SSAD0021004 | 100-240V ,5060 Hz,4.8 V,0.9 A,CB & CE ,18pin plug | | |
| | | ADAPTOR,AC-DC | SSAD0021006 | 100-240V ,5060 Hz,4.8 V,0.9 A,CB & CE ,18pin plug | | |
| | | ADAPTOR,AC-DC | SSAD0021008 | 100-240V ,5060 Hz,4.8 V,0.9 A,CE&CB ,18pin Plug ,; , , , , , ,[empty] ,I/O CONNECTOR , | | |

**Note**